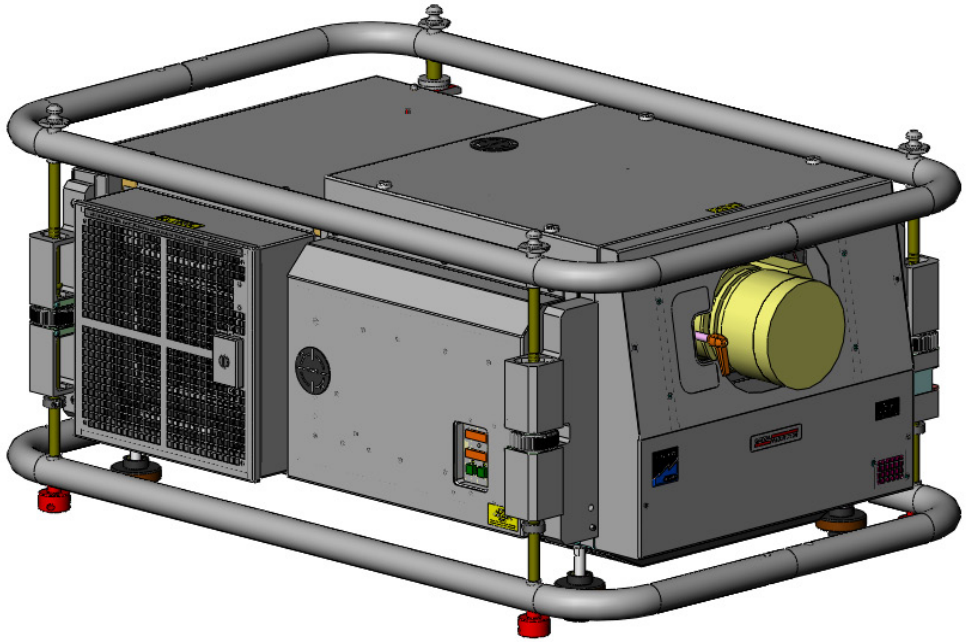
DIGITAL PROJECTION

USER MANUAL

INSTALLATION AND QUICK-START GUIDE
CONNECTION GUIDE
OPERATING GUIDE
REMOTE COMMUNICATIONS GUIDE
REFERENCE GUIDE

Lightning Series

High Brightness Digital Video Projector



Rev C May 2013

113-178C

About These Guides

Please keep these Guides handy for future reference.

A serial number is located on the back of the projector. Record it here:

Symbols used in these Guides

Many pages in this document have a dedicated area for notes. The information in that area is accompanied by the following symbols:

ELECTRICAL WARNING: this symbol indicates that there is a danger of electrical shock unless the instructions are closely followed.

WARNING: this symbol indicates that there is a danger of physical injury to yourself and/or damage to the equipment unless the instructions are closely followed.

NOTE: this symbol indicates that there is some important information that you should read.

Product revision

Because we at Digital Projection continually strive to improve our products, we may change specifications and designs, and add new features without prior notice.

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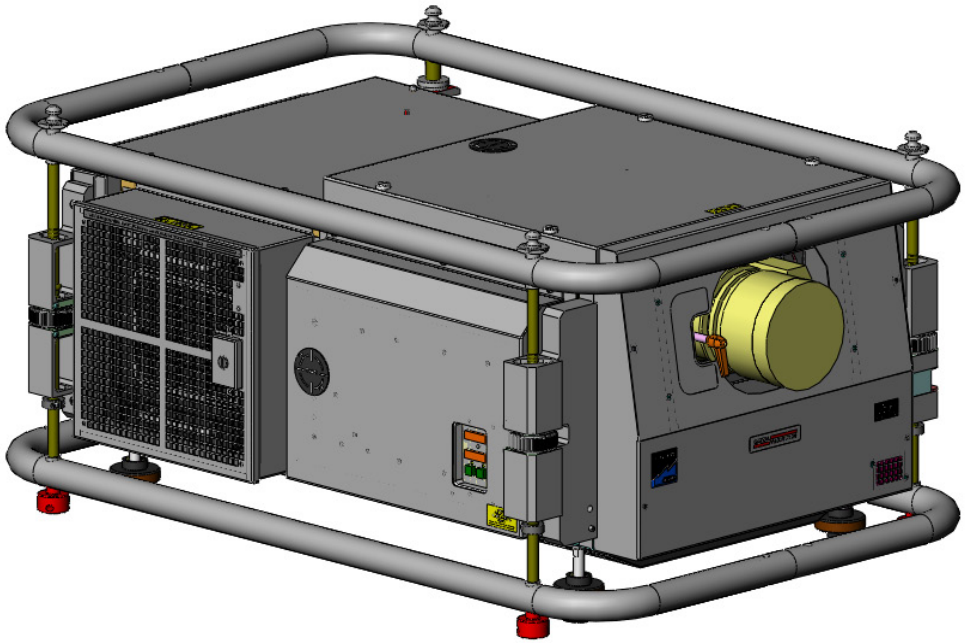
DIGITAL PROJECTION

INSTALLATION AND QUICK-START GUIDE

Lightning Series

High Brightness Digital Video Projector



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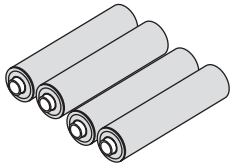
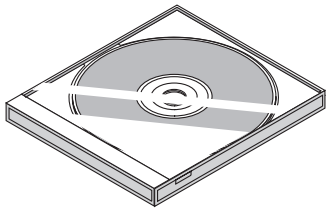
What's In The Box?

Remote control (105-023)



4x AAA batteries

Projector



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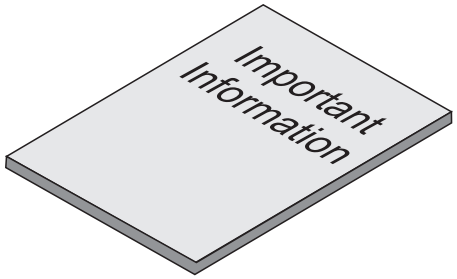
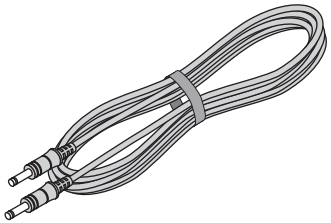


Important Information (113-182)



Remote cable (102-162)

Power cable, USA (LA00098)

Power cable, Rest of World (LA00097)

Notes

Make sure your box contains everything listed. If any pieces are missing, contact your dealer.

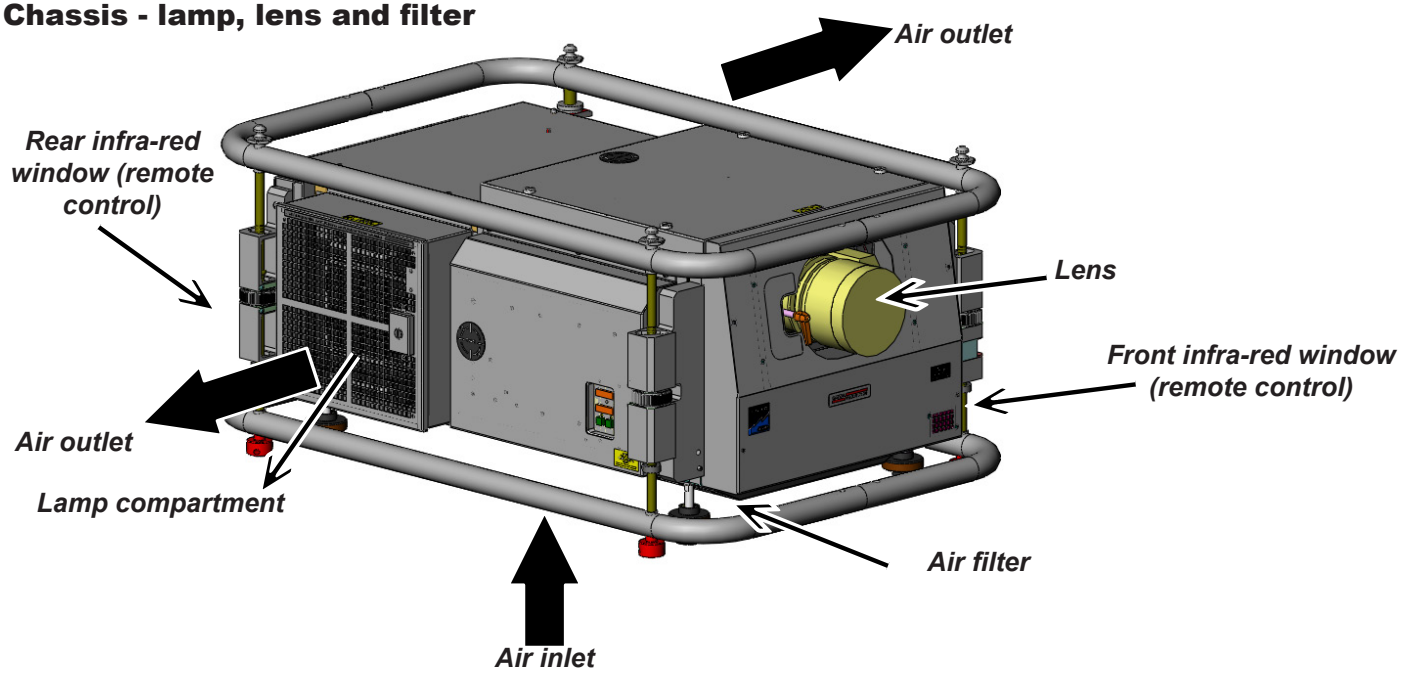
You should save the original box and packing materials, in case you ever need to ship your projector.

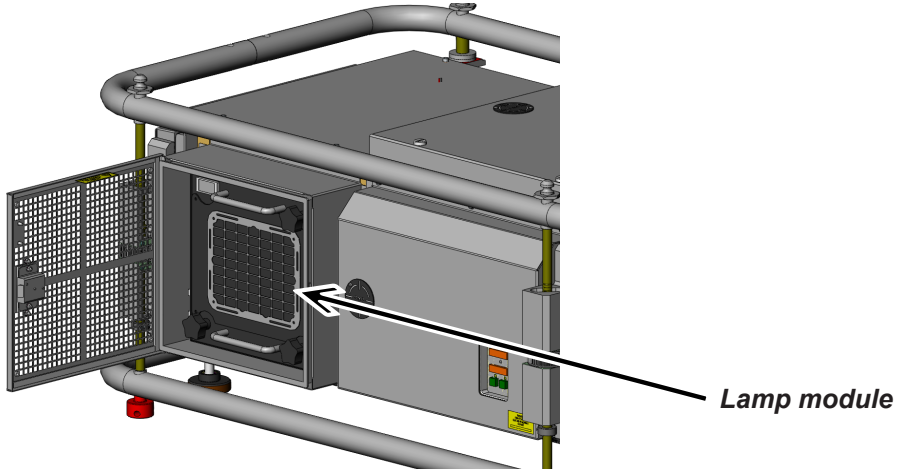
The projector is shipped without a lens.

Only one power cable - dependent on the destination territory - will be supplied with the projector.

Getting To Know The Projector

Chassis - lamp, lens and filter

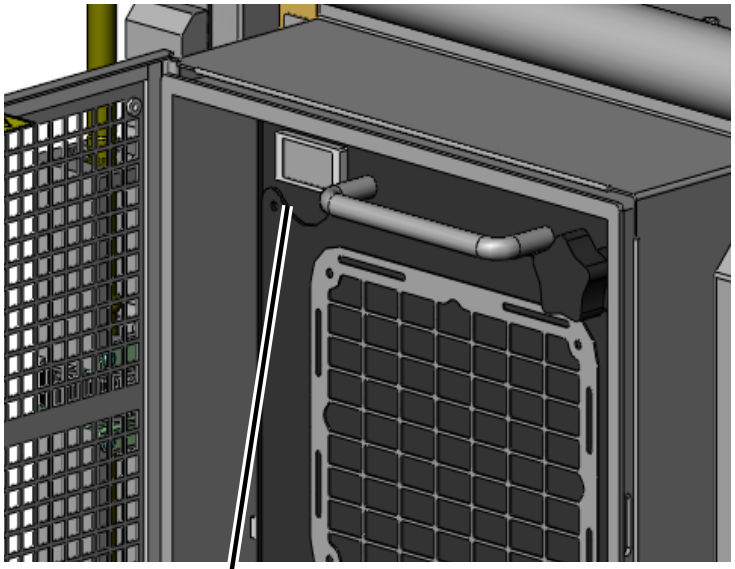




Notes

*For full details of how to use the controls and the menu system, see the **Operating Guide**.*

Lamp-hours meter



LCD meter ***Display button***

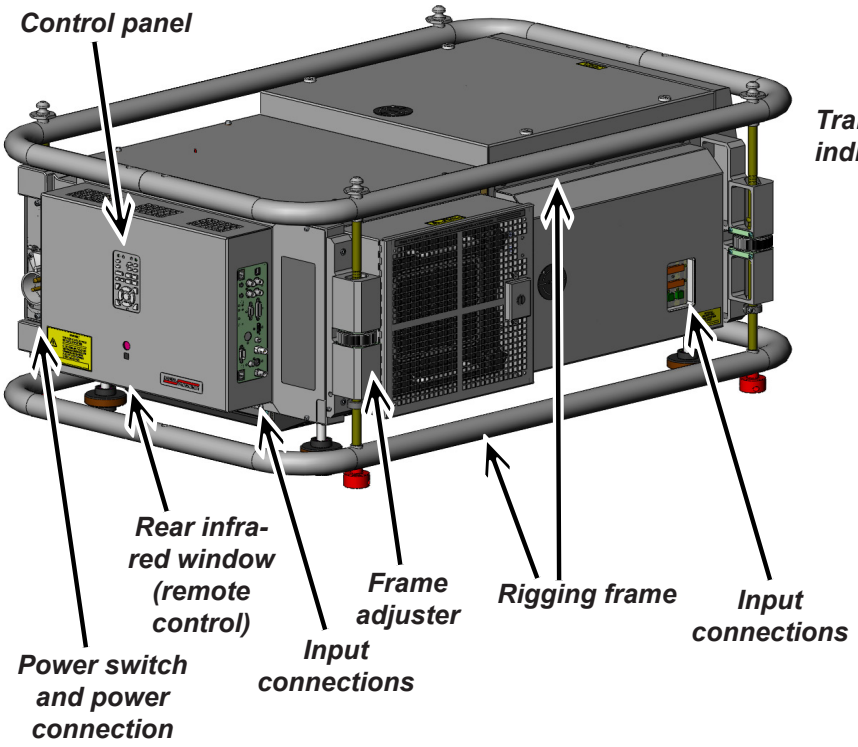
The LCD Lamp-hours meter has two modes of operation:

- When the lamp is switched on, the LCD will show lamp run hours.
- When the lamp is switched off, the LCD will be blank.

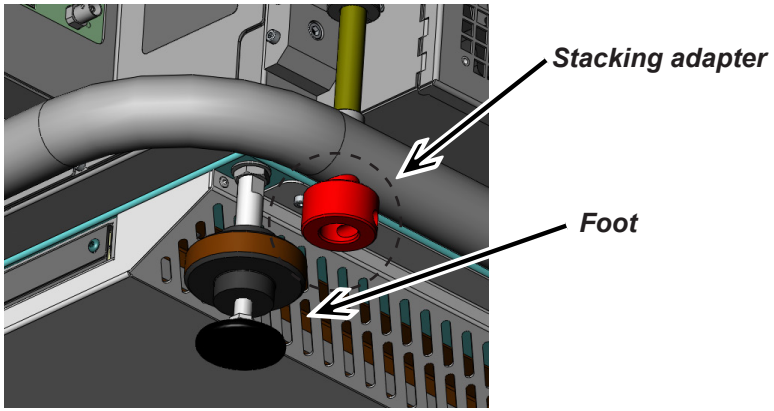
Press the button and hold for 5 seconds to display lamp run hours.

Notes

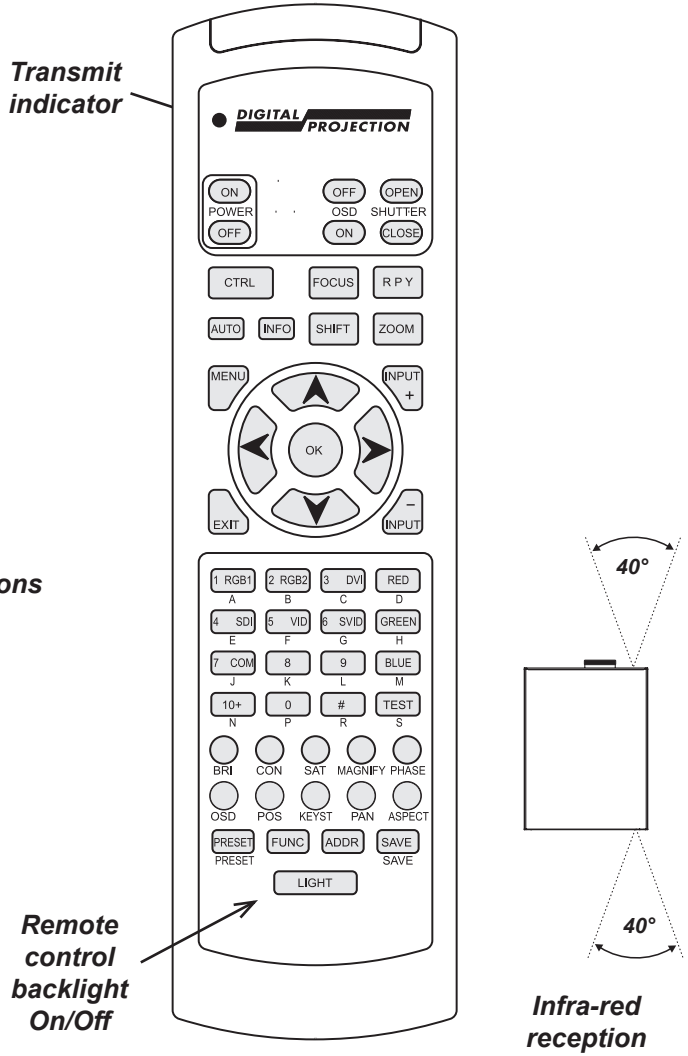
Rear and side panels – connection and control



Rigging frame



Remote control



Infra-red reception

Notes

The projector uses the standard Digital Projection infra-red remote control.

*For full details of how to use the controls and the menu system, see the **Operating Guide**.*

Control panel indicators

The indicators on the control panel are as follows:

Power *off* = NO POWER
green = normal RUNNING mode *amber* = STANDBY mode

Shutter *amber* = CLOSED *green* = OPEN

Error *off* = NO ERROR
flashing = ERROR (temperature) *steady* = ERROR (voltage)

IR *blue flash* = Remote control command received

Lamp 1 *off* = OFF
flashing red = LAMP ERROR *green* = ON (100%) *amber* = (60 - 99%)
flashing green = LAMP WARM-UP *flashing amber* = COOL-DOWN

Connection panel indicators

The indicators on the rear connection panel are as follows:

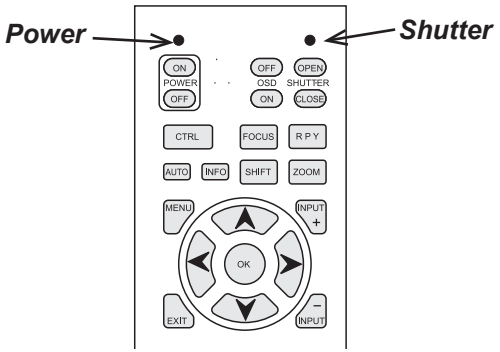
All on = Power-On Self Test

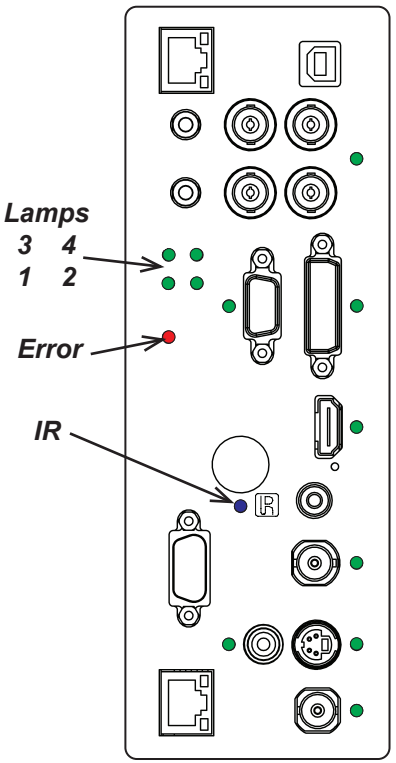
Lamp 1 ***off*** = OFF
green = ON (100%) ***amber*** = (80 - 99%)
flashing green = WARM-UP ***flashing amber*** = COOL-DOWN
red (projector in standby) = Lamp Comms Error (call service)
red (projector on) = Ballast Comms Error (call service)
flashing red (projector in standby) = Lamp Error on previous operation
flashing red (projector on) = Lamp / Interlock Error

Error ***flashing*** = Fan / System Error ***steady*** = Voltage Error

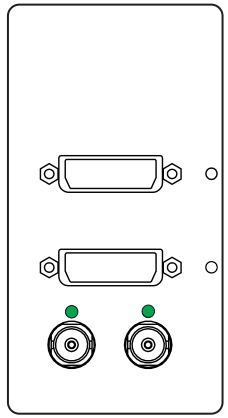
IR ***blue flash*** = Remote control command received

Inputs The indicators next to the input connectors on both panels are as follows:
off = not selected
green = input selected, signal detected, and in range
flashing green = input selected, but signal not detected or out of range





Rear Connection Panel



Side Connection Panel

Notes

*For full details of how to use the controls and the menu system, see the **Operating Guide**.*

*For more information about the connection panels, see the **Connection Guide**.*

Only the Lamp 1 indicator is active on this projector.

Positioning The Screen And Projector

- Install the screen, ensuring that it is in the best position for viewing by your audience.
- Position the projector, ensuring that it is at a suitable distance from the screen for the image to fill the screen.

Mounting the projector

The projector is designed to be suspended from a lighting truss by its rigging frame. However, the four adjustable feet under the chassis allow the projector to be lowered onto a flat surface without any danger of hands being trapped between the bottom frame and the surface.

Adjustment for table mounting

If the projector is to be operated from a flat surface such as a projector table, then adjustment of projector level should be made by turning the four feet under the chassis.

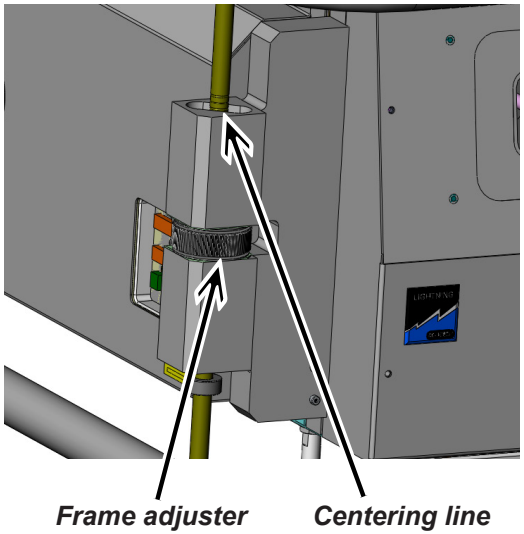
Adjusting the rigging frame

Before suspending the projector, make sure that the three frame adjusters and the yaw adjustment are set roughly midway. Centering lines are scribed on the shafts to show the centres of adjustment.

Coarse frame adjustment

Coarse adjustment of projector level should be made by adjusting the length of the supporting wires or chains, or by adjusting the position of the truss.

Once the initial coarse frame adjustment has been made, fine adjustment should be made using the three frame adjusters and the yaw handle (if fittled) on the rigging frame.



Notes

Always allow the projector to cool for 5 minutes before disconnecting the power or moving the projector.

Ensure that there is at least 30cm (12in) of space between the ventilation outlets and any wall, and 10cm (4in) on all other sides.

Do not stack more than 3 projectors.

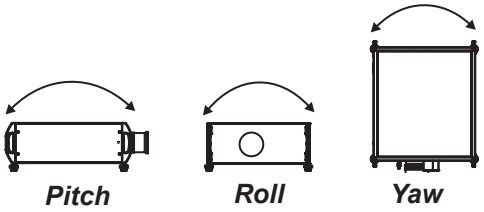
Do not place heavy objects on top of the projector chassis. Only the chassis corners and the rigging frame are capable of withstanding the weight of another projector.

Do not place the projector with its front panel down on a surface, as this may damage the lens or the lens release lever.

Backup safety chains or wires should always be used with ceiling mount installations.

Pitch and Roll adjustment

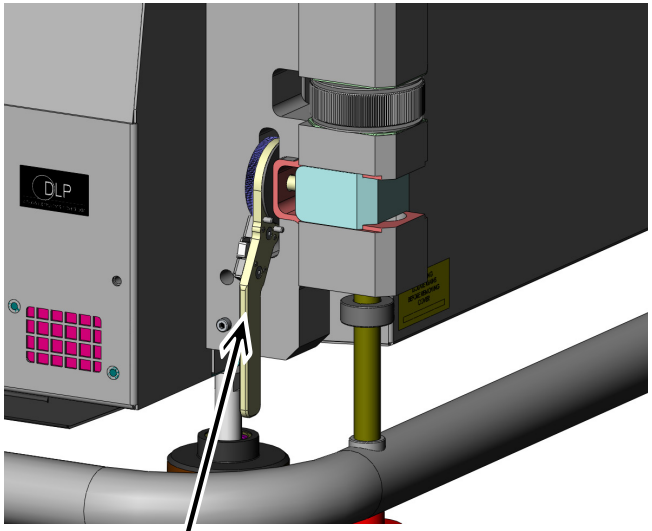
The frame adjusters can provide approximately ±10mm of vertical movement relative to the rear right corner, giving approximately ±0.65° pitch and ±0.85° roll. It is not possible, however, to achieve maximum adjustment in pitch, roll and yaw simultaneously.

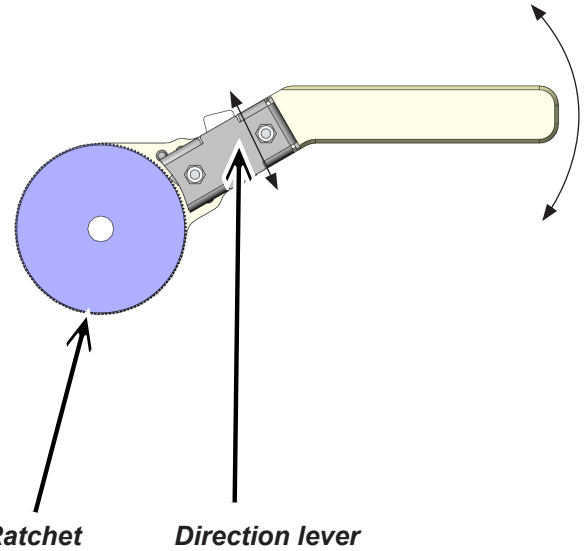


Yaw adjustment

The yaw handle uses a ratchet to move the front of the projector from left to right. To change the direction of movement, push the direction lever on the handle up or down.

The yaw handle can provide approximately ±11mm of left-right movement relative to the rear right corner, giving approximately ±0.75° yaw. It is not possible, however, to achieve maximum adjustment in both tilt, roll and yaw simultaneously.

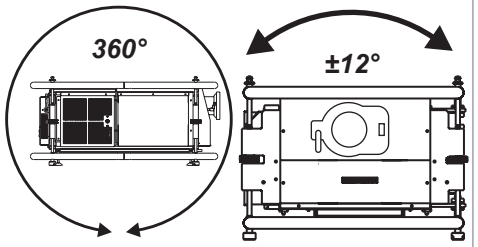




Notes

Do not tilt the projector more than ±12° from side to side when in use, as this may cause serious lamp failure, damage the lamp module and cause extra cost on replacement.

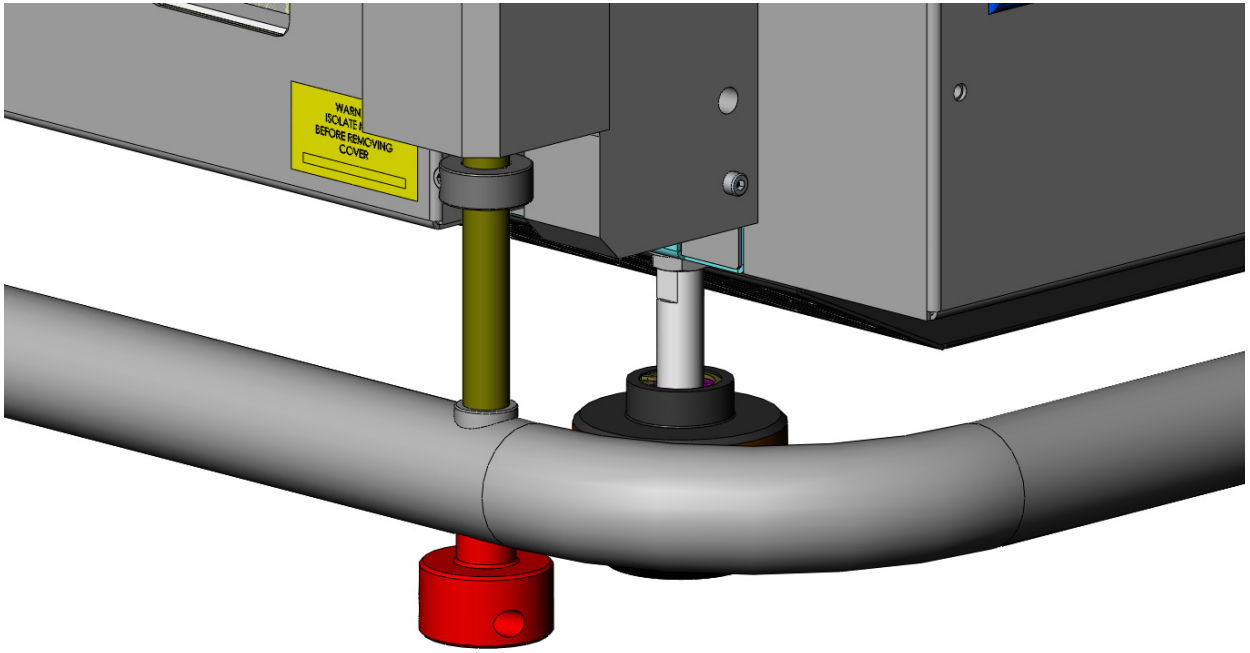
The projector my be tilted forwards and backwards as necessary.



Stacking projectors

The rigging frame is capable of supporting the weight of up to three other projectors, using the built-in stacking adapters. The projectors can be stacked on top of each other, or suspended below each other.

- Carefully lower each projector down onto the top of the others, making sure that all four stacking adapters engage fully.
- Fit a locking pin into each adapter. A ball in the end of the pin prevents the pin from falling out – to insert or remove a locking pin, press the button on the t-bar to release the ball.



Stacking adapter with hole for locking pin

Notes

Do not try to stack more than four projectors.

When stacking projectors, the stack MUST be vertical, to ensure that the stresses are distributed to all four stacking adapters.

Make sure that the surface, ceiling or rigging that is to support the projector is capable of supporting the combined weight of all the projectors and lenses (see specification for weights).

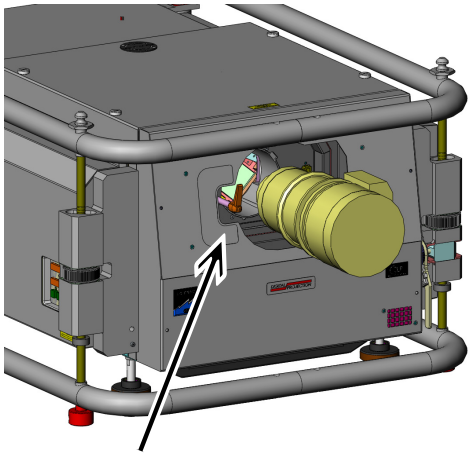
Do not place heavy objects on top of the projector chassis. Only the rigging frame is capable of withstanding the weight of another projector.

Separate backup safety chains or wires should always be used for each projector.

*For information about aligning the images from the projectors, see the **Operating Guide**, section **A Tour of the Menus - Edge Blend**.*

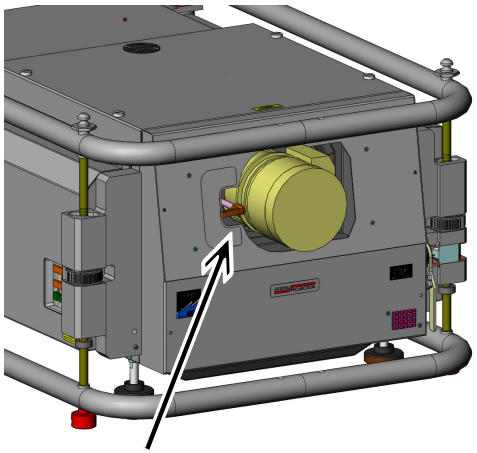
Fitting The Lens

- Turn the lens release lever clockwise so that it is pointing upwards, to open the lock fully.
- Remove the rear lens cap from the lens.
- Insert the lens into the lens aperture, making sure that the plug on the zoom drive mechanism lines up with the socket on the front of the projector, then push the lens in firmly as far as it will go.



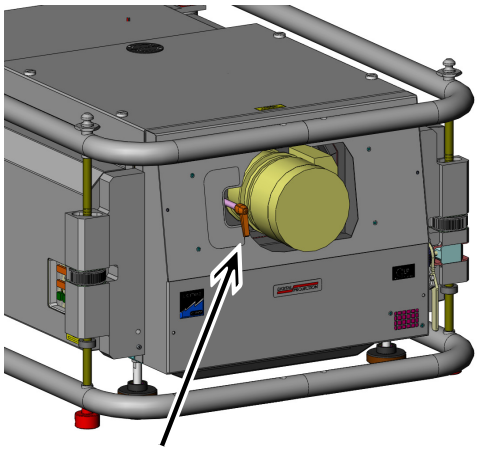
Lens release lever pointing upwards

- Turn the lens release lever anti-clockwise to the mid-position.
- The lens can now be pushed in further. Push the lens in firmly as far as it will go.



Lens release lever in mid-position

- Turn the lens release lever fully anti-clockwise so that it is pointing downwards, to close the lock fully.



Lens release lever pointing downwards

Notes

Always allow the lamp to cool for 5 minutes before:

- disconnecting the power
- moving the projector

The lens release lever should always be set to the locked position to prevent the lens from falling out.

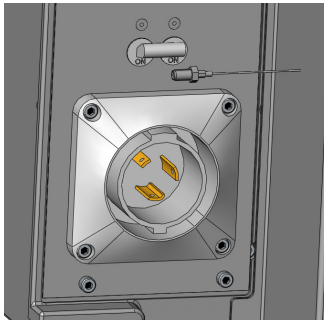
Do not place the projector with its front panel down on a surface, as this may damage the lens or the lens release lever.

Operating The Projector

Switching the projector on

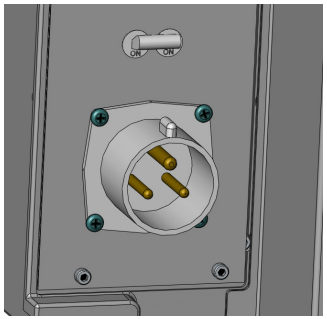
- Make sure the main power switch is off, then connect the power cable between the mains supply and the projector, depending on your location:

USA power input



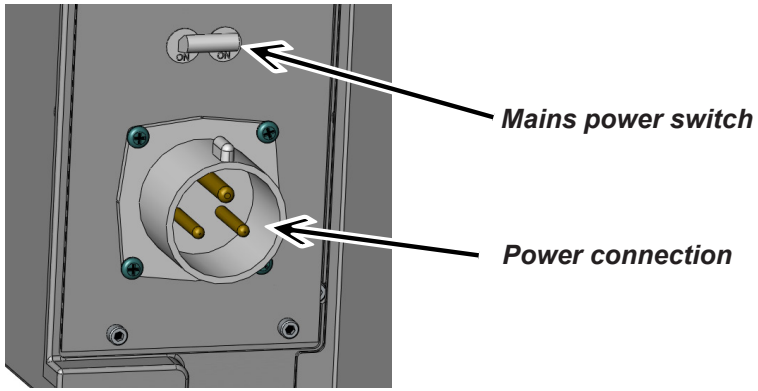
Firmly push in the Hubbell connector, then turn clockwise to lock.

Rest of the world power input



Lift the lid of the C-form connector, then firmly push in the connector.

- Push the main power switch upwards to switch the power ON.
- Wait until the self-test has completed and the standby indicator on the projector control panel shows amber. The lamp will be off and the projector will be in STANDBY mode.
- Press (ON) on the remote control or the control panel and hold for 3 seconds, to switch the projector ON. The power indicator on the control panel will show green, the lamp will light and the shutter will open.



Notes

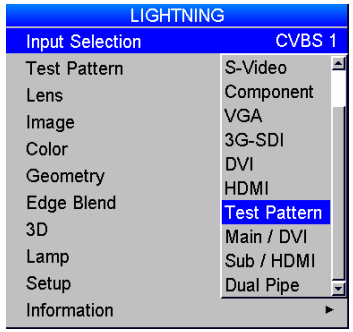
Selecting an input signal or test pattern

Input signal

- Connect an image source to the projector. The signal should be automatically detected by the projector, and should be displayed within two or three seconds.

If more than one signal is connected, then select the image you want to display:

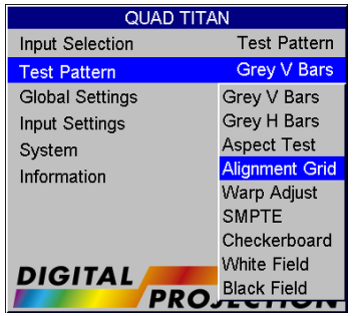
- Press one of the **Input buttons**, [1] to [10+] or [#] (dual pipe) on the remote control, or
- Open the On-screen display (OSD) by pressing [MENU].
- Select an input signal from the **Input Selection** menu, using the ▲ ▼ and [OK] buttons.



Test pattern

If you have no image source connected to the projector, then you can display a test pattern instead:

- Open the OSD by pressing [MENU].
- Select **Test Pattern** from the **Input Selection** menu, using the ▲ ▼ and [OK] buttons.
- Select a pattern from the **Test Pattern** menu, using the ▲ ▼ and [OK] buttons.
- Close the OSD by pressing [MENU] again.



Adjusting the lens

- The lens can be adjusted using the **Lens** menu, or:

Zoom

- Press [ZOOM] followed by ▲ and ▼ to adjust the size of the image on the screen. When the adjustment is finished, press [EXIT].

Focus

- Press [FOCUS] followed by ▲ and ▼ to adjust the focus. When the adjustment is finished, press [EXIT].

Shift

- Press [SHIFT] followed by ▲, ▼, ◀ and ▶ to adjust the position of the image on the screen. When the adjustment is finished, press [EXIT].

Notes

When any of the three Lens adjustment keys is pressed, the blue Transmit indicator on the remote control will light for 10 seconds:

- after 10 seconds, if no adjustment has been made, the indicator will go out and the Lens adjustment key must be pressed again to resume adjustment.

- to end the adjustment before 10 seconds has elapsed, press the [EXIT] key.

- all other adjustments will be locked out until the Lens adjustment is ended.

*For full details of how to use the controls and the menu system, see the **Operating Guide**.*

Adjusting the image

Orientation and On-Screen Display settings

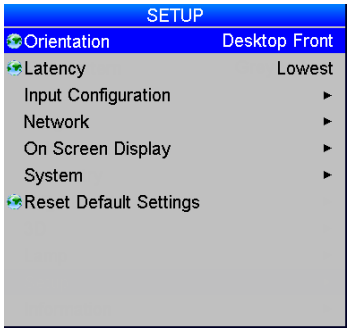
- These can be set from the **Setup** menu.

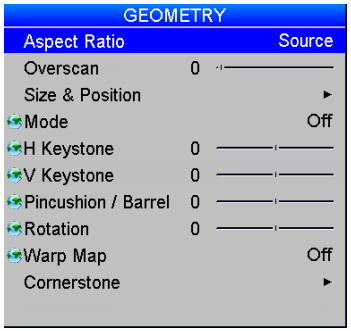
Keystone

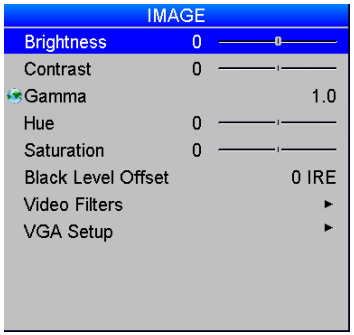
- This can be set from the **Geometry** menu.

Picture

- Settings such as **Brightness** and **Contrast** can be set from the **Image** menu.
- You can also set **Brightness**, **Contrast** or **Saturation** by pressing (BRI), (CON) or (SAT) on the remote control.

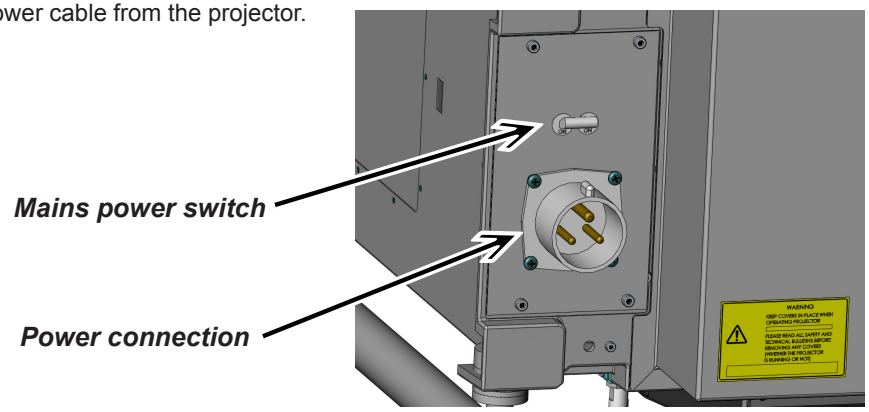






Switching the projector off

- Press (OFF) on the remote control or the control panel, and hold for 3 seconds, to switch the projector OFF. The power indicator on the control panel will show amber, the lamp will be off and the projector will be in STANDBY mode.
- Switch off at the mains power switch. Disconnect the power cable from the projector.



Notes

Main Menu
Setup

Main Menu
Geometry

Main Menu
Image

*For full details of how to use the controls and the menu system, see the **Operating Guide**.*

Always allow the lamp to cool for 5 minutes before:

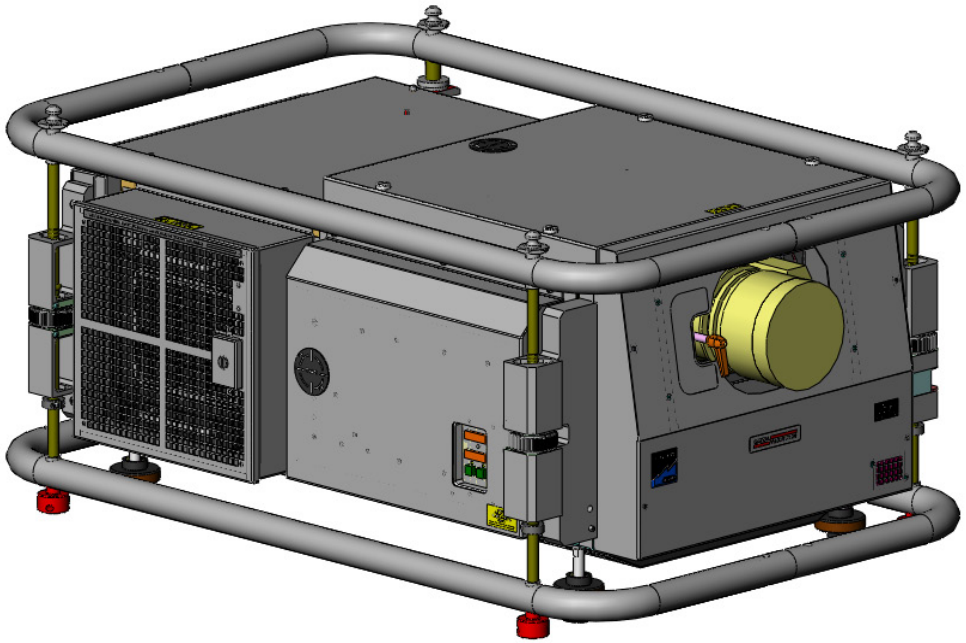
- disconnecting the power
- moving the projector

DIGITAL PROJECTION

CONNECTION GUIDE

Lightning Series

High Brightness Digital Video Projector



Rev C May 2013

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Signal Inputs And Outputs

Rear Connection Panel

VGA *(input 1)*

- Use **Auto Setup** in the **Image/VGA Setup** menu. For more settings, see the ***Operating Guide***.

HDMI *(input 2)*, **DVI** *(input 3)*

Analog or Digital DVI-I

- Set **DVI-I Port** in the **Setup/Input Configuration** menu to choose between **Analog** and **Digital**. For more settings, see the ***Operating Guide***.

SPDIF

- Compatible audio sample packets on the ***HDMI*** input stream are decoded by the projector and output on the ***SPDIF*** connector. This is a digital output.

3G-SDI *(input 4)*

- If two video streams are being transmitted, set **3G Level B Stream** in the **Setup/Input Configuration** menu to choose between the two streams.

CVBS1 *(input 5)*

- Connect a ***Composite Video*** input signal to the BNC connector.

S-Video *(input 6)*

- Connect to the 4-pin mini-DIN connector.

Component *(input 7)*

RGsB or RGBS

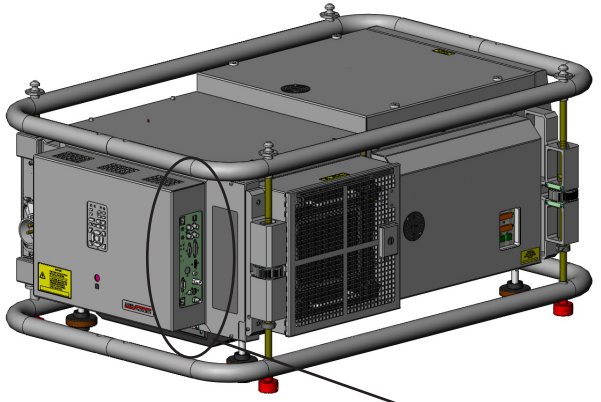
- Set **Component Colour Space** in the **Setup/Input Configuration** menu to **RGB**.
- Set **Component Sync Type** to **Auto**, except when the projector has problems selecting between **3 Wire** (RGsB) and **4 Wire** (RGBS).

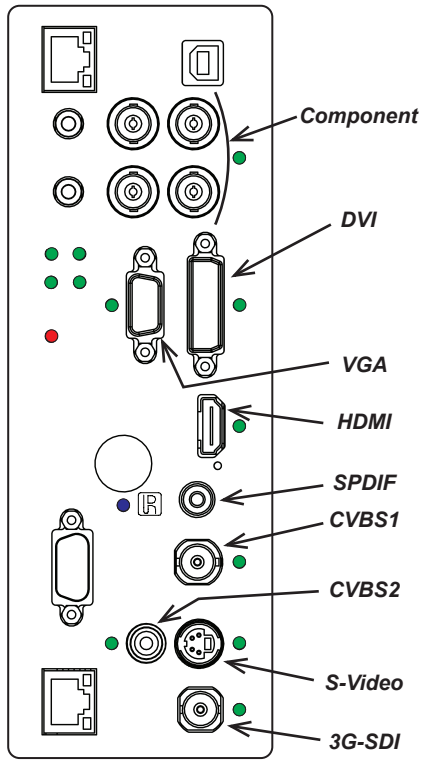
YPbPr

- Set **Component Colour Space** in the **Setup/Input Configuration** menu to **YPbPr**.

CVBS2 *(input 8)*

- Connect a ***Composite Video*** input signal to the RCA phono connector.





Rear Connection Panel

Notes

*For a complete listing of pin configurations for all signal and control connectors, see **Wiring Details** later in this Guide.*

See the next page for important information about the differences between the two connection panels.

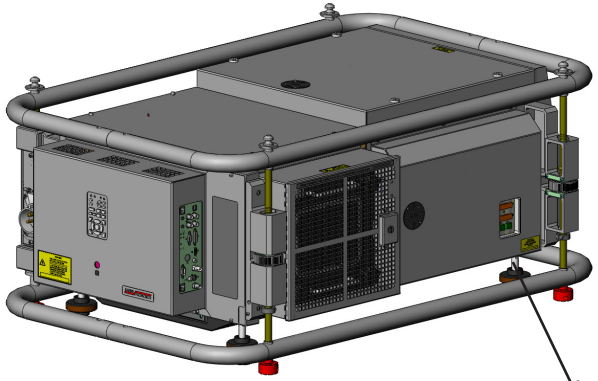
Side Connection Panel

DVI *(input 9)*

- Single or Dual Link DVI-D input, or
- For Twin-Link DVI, ***Input 9*** (DVI) is the Main input, ***Input 10*** (DVI/HDMI) is the Sub input.

DVI/HDMI *(input 10)*

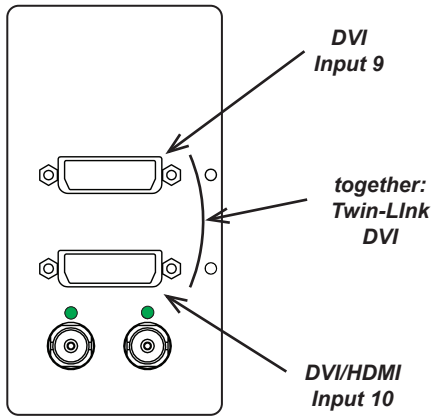
- Single HDMI 1.4 input, or
- Single Link DVI-D input, or
- For Twin-Link DVI, ***Input 9*** (DVI) is the Main input, ***Input 10*** (DVI/HDMI) is the Sub input.



Notes

*For a complete listing of pin configurations for all signal and control connectors, see **Wiring Details** later in this Guide.*

For information about 3D video, see the next page.

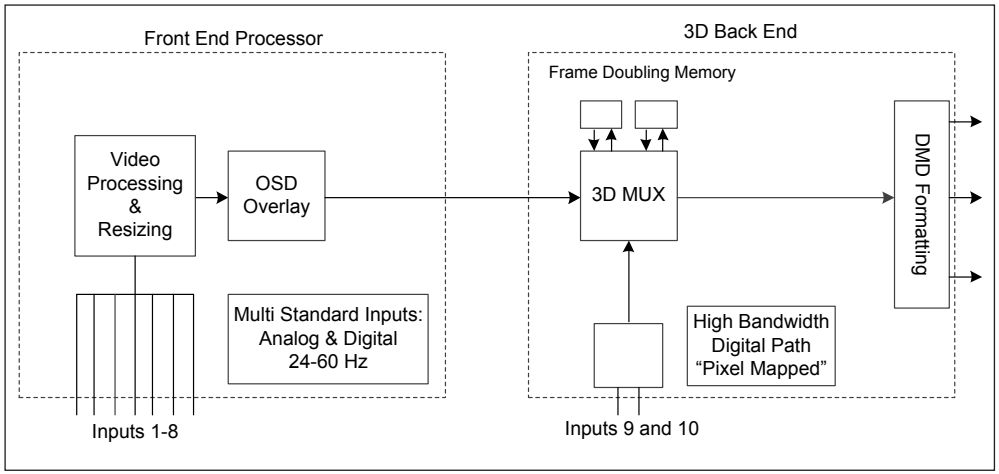


Side Connection Panel

Differences between the two Connection Panels

Inputs 9 and 10 have been designed to give a very high bandwidth digital video path, free of the limitations inherent to standard image processing techniques.

As such, the image is pixel-mapped directly to the DMDs, so not all of the Image Controls available to Inputs 1-8 apply to Inputs 9 and 10.



3D connections

3D sources up to 60Hz requiring frame doubling and left/right interleaving

- Connect to any of the Inputs on the ***Rear Connection Panel***.
- Set **3D Type** in the **3D** menu to **Auto**, except when the projector has problems selecting between **Sequential**, **Frame Packing**, **Top-and-Bottom** and **Side-by-Side (Half)**.

3D sources above 60Hz not requiring frame doubling

- Connect to either of the Inputs on the ***Side Connection Panel***.
- Set **3D Type** in the **3D** menu to **Auto**, except when the projector has problems selecting between **Sequential**, **Frame Packing**, **Top-and-Bottom** and **Side-by-Side (Half)**.

Dual Pipe 3D

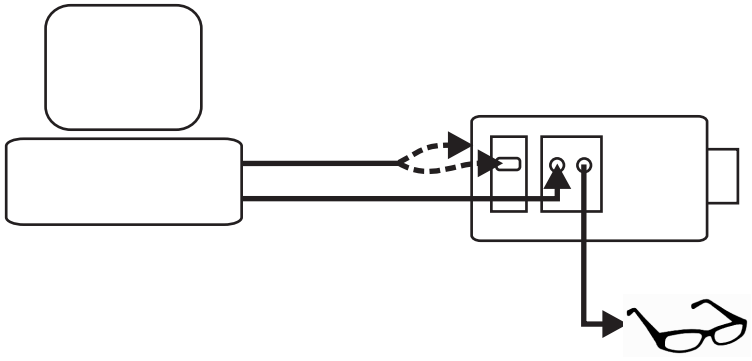
- Connect to both of the Inputs on the Side Connection Panel.
- ***Input 9*** (DVI) is the ***left*** image, and ***Input 10*** (DVI/HDMI) is the ***right*** image.

3D Sync in

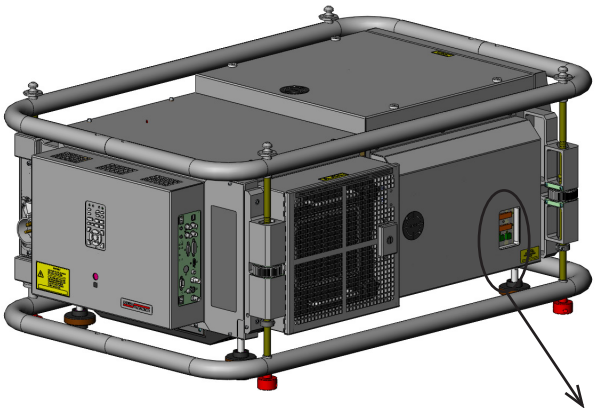
- Sync input signal.

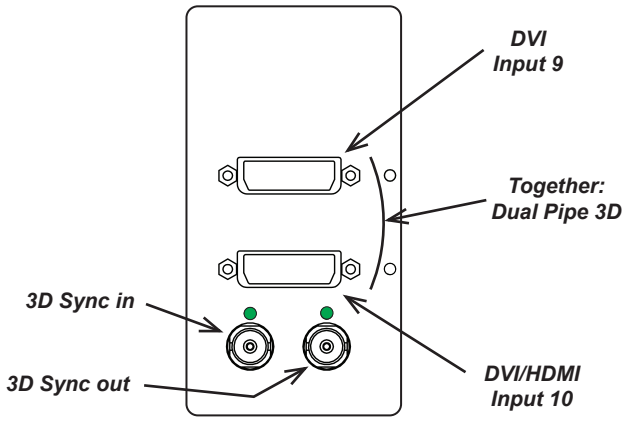
3D Sync out

- Sync output signal. This may be affected by the **Sync Offset** and **Output Sync Polarity** settings in the **3D** menu



3D glasses or ZScreen





Side Connection Panel

Notes

*For a complete listing of pin configurations for all signal and control connectors, see **Wiring Details** later in this Guide.*

Control Connections

Update port

- The Update Port is used to download, via LAN, firmware updates issued from time to time by Digital Projection.

Service port

- The Service Port port is used to download, via USB, firmware updates issued from time to time by Digital Projection.

Wired remote control

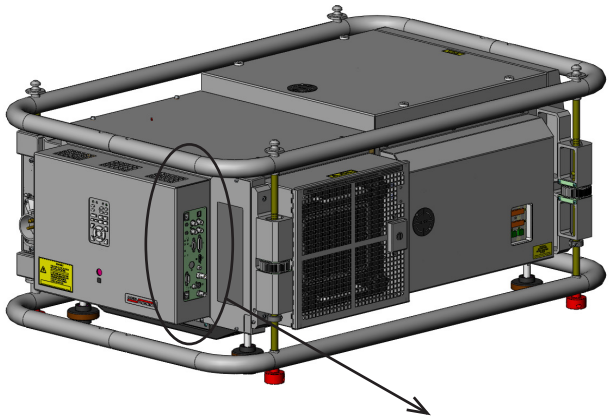
- If infrared signals from the remote control cannot reach the projector due to excessive distance or obstructions such as walls or cabinet doors, you can connect an external IR repeater to the remote control input, and position its IR sensor within range of the operator.
- To synchronise the control of multiple projectors, connect the ***Wired Remote Output*** of one projector to the ***Wired Remote Input*** of another.

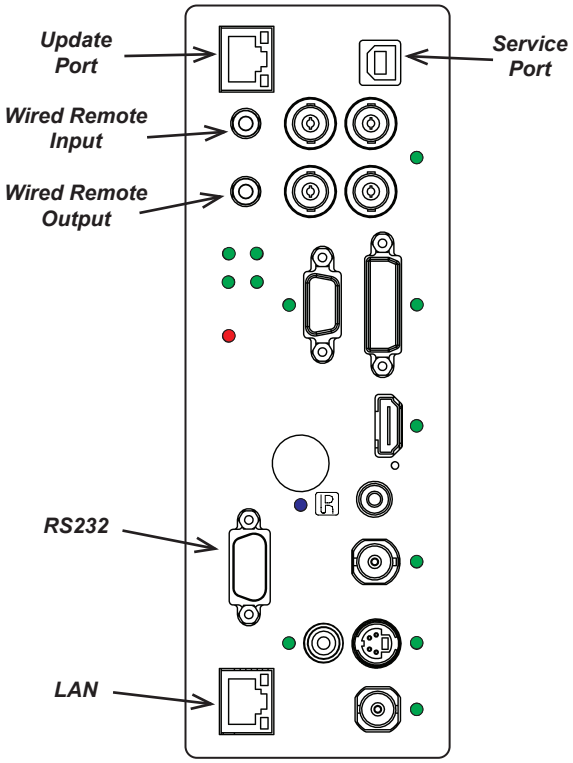
RS232

- All of the projector's features can be controlled via a serial connection, using the text strings described in the ***External Control Protocol***.
- Use a null-modem cable to connect directly to a computer, or a straight cable to connect to a modem.

LAN

- All of the projector's features can be controlled via a LAN connection, using the text strings described in the ***External Control Protocol***.
- Alternatively, for details of how to use the ***Web Configuration Utility*** to control the projector, see the ***Operating Guide***.
- Use a crossed LAN cable to connect directly to a computer, or an uncrossed cable to connect to a network hub.





Rear Connection Panel

Notes

*For a complete listing of pin configurations for all signal and control connectors, see **Wiring Details** later in this Guide.*

Only one remote connection (RS232 or LAN) should be used at any one time.

Note that plugging in the remote control cable will disable the infra-red.

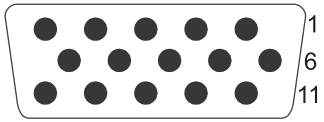
Wiring Details

Signal inputs and outputs

Input 1: VGA

15 way D-type connector

1	R
2	G
3	B
4	unused
5	Digital Ground (H Sync)
6	R Ground
7	B Ground
8	G Ground
9	+5V
10	Digital Ground (V Sync/DDC)
1	unused
12	SDA
13	H Sync
14	V Sync
15	SCL



VGA: pin view of female connector

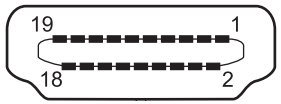
Notes

*For full details of all input settings, see the **Operating Guide**.*

Input 2: HDMI

19 way type A connector

1	TMDS Data 2+
2	TMDS Data 2 Shield
3	TMDS Data 2-
4	TMDS Data 1+
5	TMDS Data 1 Shield
6	TMDS Data 1-
7	TMDS Data 0+
8	TMDS Data 0 Shield
9	TMDS Data 0-
10	TMDS Clock+
11	TMDS Clock Shield
12	TMDS Clock-
13	CEC
14	not connected
15	SCL (DDC Clock)
16	SCA (DDC Data)
17	DDC/CEC Ground
18	+5 V Power
19	Hot Plug Detect



HDMI: pin view of panel connector

Output: SPDIF

RCA Phono

Digital audio output from the HDMI input stream.

SPDIF connector

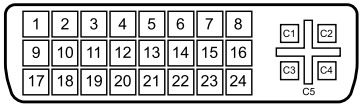
Notes

*For full details of all input settings, see the **Operating Guide**.*

Input 3: DVI

24 way D-type connector

Pin 1	TMDS data 2−	Digital red− (link 1)
Pin 2	TMDS data 2+	Digital red+ (link 1)
Pin 3	TMDS data 2/4 shield	
Pin 4	TMDS data 4−	Digital green− (link 2)
Pin 5	TMDS data 4+	Digital green+ (link 2)
Pin 6	DDC clock	
Pin 7	DDC data	
Pin 8	Analog vertical sync	
Pin 9	TMDS data 1−	Digital green− (link 1)
Pin 10	TMDS data 1+	Digital green+ (link 1)
Pin 11	TMDS data 1/3 shield	
Pin 12	TMDS data 3-	Digital blue− (link 2)
Pin 13	TMDS data 3+	Digital blue+ (link 2)
Pin 14	+5 V	Power for monitor when in standby
Pin 15	Ground	Return for pin 14 and analog sync
Pin 16	Hot plug detect	
Pin 17	TMDS data 0−	Digital blue− (link 1) and digital sync
Pin 18	TMDS data 0+	Digital blue+ (link 1) and digital sync
Pin 19	TMDS data 0/5 shield	
Pin 20	TMDS data 5−	Digital red− (link 2)
Pin 21	TMDS data 5+	Digital red+ (link 2)
Pin 22	TMDS clock shield	
Pin 23	TMDS clock+	Digital clock+ (links 1 and 2)
Pin 24	TMDS clock−	Digital clock− (links 1 and 2)
C1	Analog red	
C2	Analog green	
C3	Analog blue	
C4	Analog horizontal sync	
C5	Analog ground	Return for R, G, and B signals



DVI: pin view of female connector

Notes

High-bandwidth Digital Content Protection (HDCP) is supported on this input.

*For full details of all input settings, see the **Operating Guide**.*

Input 4: 3G-SDI

75 ohm BNC

3G-SDI connector

Input 5: Composite 1

75 ohm BNC

Composite 1 connector

Input 6: S-Video

4 pin mini-DIN

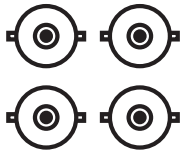
1	Y Ground
2	C Ground
3	Luminance (Y)
4	Chrominance (C)

S-Video: pin view of female connector

Input 7: Component

4 x 75 ohm BNC

	RGsB	RGBS	YPrPb
Pb/B	B	B	Pb/Cb
Y/G	G + Sync	G	Y
Pr/R	R	R	Pr/Cr
SYNC		Sync	



Component

Input 8: CVBS

RCA Phono

CVBS connector

Notes

3G-SDI signals are very high speed digital signals which require better quality coaxial cable than conventional analogue video. The data rate is 3 Gigabits per second.

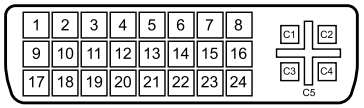
In choosing cable length and connectors for any installation the frequency response loss in decibels should be proportional to √f, from 1MHz, to 3GHz.

*For full details of all input settings, see the **Operating Guide**.*

Input 9: MAIN/DVI

24 way D-type connector

Pin 1	TMDS data 2−	Digital red− (link 1)
Pin 2	TMDS data 2+	Digital red+ (link 1)
Pin 3	TMDS data 2/4 shield	
Pin 4	TMDS data 4−	Digital green− (link 2)
Pin 5	TMDS data 4+	Digital green+ (link 2)
Pin 6	DDC clock	
Pin 7	DDC data	
Pin 8	Analog vertical sync	
Pin 9	TMDS data 1−	Digital green− (link 1)
Pin 10	TMDS data 1+	Digital green+ (link 1)
Pin 11	TMDS data 1/3 shield	
Pin 12	TMDS data 3-	Digital blue− (link 2)
Pin 13	TMDS data 3+	Digital blue+ (link 2)
Pin 14	+5 V	Power for monitor when in standby
Pin 15	Ground	Return for pin 14 and analog sync
Pin 16	Hot plug detect	
Pin 17	TMDS data 0−	Digital blue− (link 1) and digital sync
Pin 18	TMDS data 0+	Digital blue+ (link 1) and digital sync
Pin 19	TMDS data 0/5 shield	
Pin 20	TMDS data 5−	Digital red− (link 2)
Pin 21	TMDS data 5+	Digital red+ (link 2)
Pin 22	TMDS clock shield	
Pin 23	TMDS clock+	Digital clock+ (links 1 and 2)
Pin 24	TMDS clock−	Digital clock− (links 1 and 2)
C1	Analog red	
C2	Analog green	
C3	Analog blue	
C4	Analog horizontal sync	
C5	Analog ground	Return for R, G, and B signals



MAIN/DVI: pin view of female connector

Notes

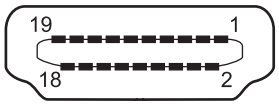
High-bandwidth Digital Content Protection (HDCP) is supported on this input.

*For full details of all input settings, see the **Operating Guide**.*

Input 10: SUB/HDMI

19 way type A connector

1	TMDS Data 2+
2	TMDS Data 2 Shield
3	TMDS Data 2-
4	TMDS Data 1+
5	TMDS Data 1 Shield
6	TMDS Data 1-
7	TMDS Data 0+
8	TMDS Data 0 Shield
9	TMDS Data 0-
10	TMDS Clock+
11	TMDS Clock Shield
12	TMDS Clock-
13	CEC
14	not connected
15	SCL (DDC Clock)
16	SCA (DDC Data)
17	DDC/CEC Ground
18	+5 V Power
19	Hot Plug Detect



HDMI: pin view of panel connector

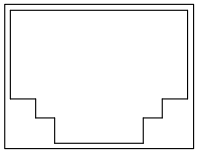
Notes

*For full details of all input settings, see the **Operating Guide**.*

Control connections

Update port

RJ45 socket

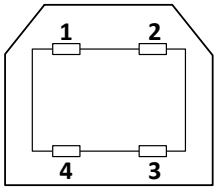


Update port

Service port

USB type B socket

Pin 1	VCC (+5 V)
Pin 2	Data−
Pin 3	Data+
Pin 4	Ground

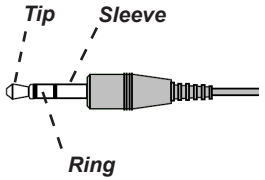


Service port:
pin view of female connector

Wired remote control

3.5mm mini jack

Tip	Power
Ring	Signal
Sleeve	Ground



pin view of female connector

Notes

*For full details of all network settings, see the **Operating Guide**.*

Note that plugging in the remote control cable will disable the infra-red.

RS232

9 way D-type connector

1 unused

2 Received Data (RX)

3 Transmitted Data (TX)

4 unused

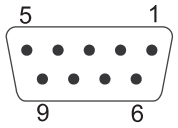
5 Signal Ground

6 unused

7 unused

8 unused

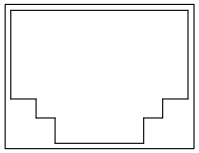
9 unused



RS232:
pin view of female connector

LAN connection

RJ45 socket



LAN connection

Notes

Only one remote connection (RS232 or LAN) should be used at any one time.

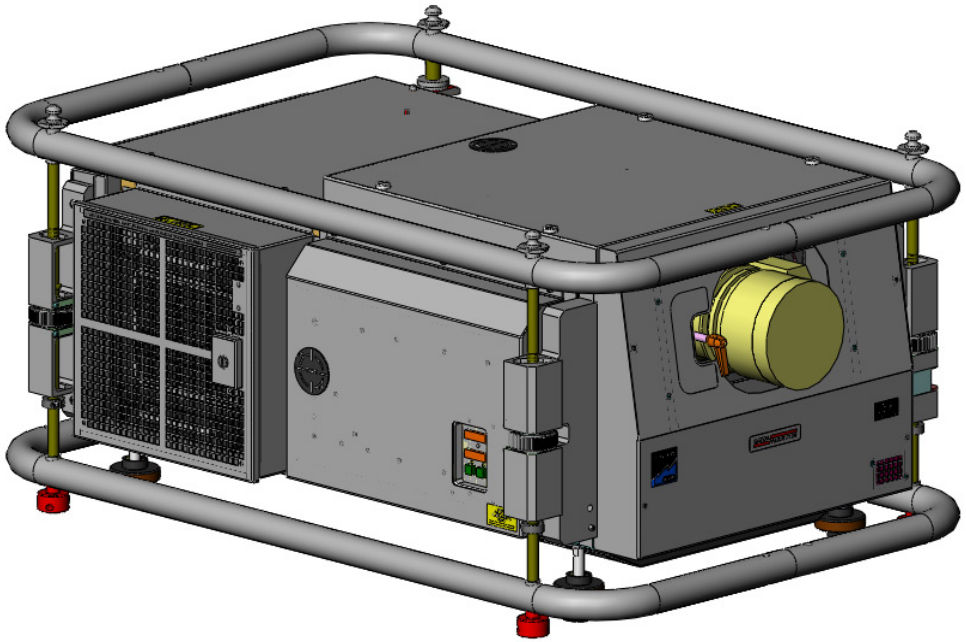
For full details of all network settings, see the ***Operating Guide****.*

DIGITAL PROJECTION

OPERATING GUIDE

Lightning Series

High Brightness Digital Video Projector



Rev C May 2013

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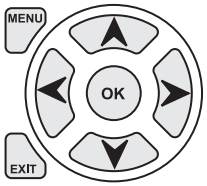
Using The Menus

Use the buttons on the projector control panel or on the remote control, to access the menu system.



- To open or close the on-screen display (OSD), press MENU.

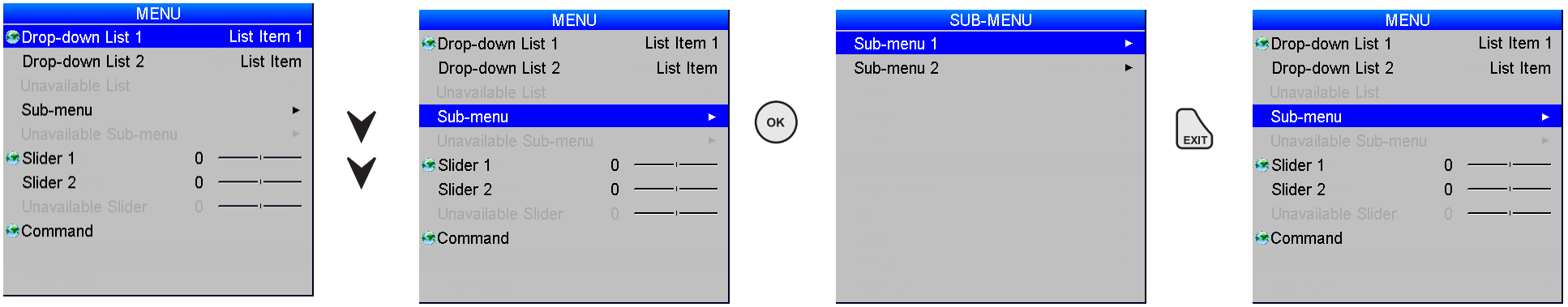
Menus and sub-menus

- To open a sub-menu, select it using ▲ and ▼, then press OK.
- To return to the previous menu, press EXIT.

Notes

Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

*When **a globe icon** appears next to a setting, the setting affects all sources and all inputs; otherwise, only the current input source will be affected if you change the setting.*



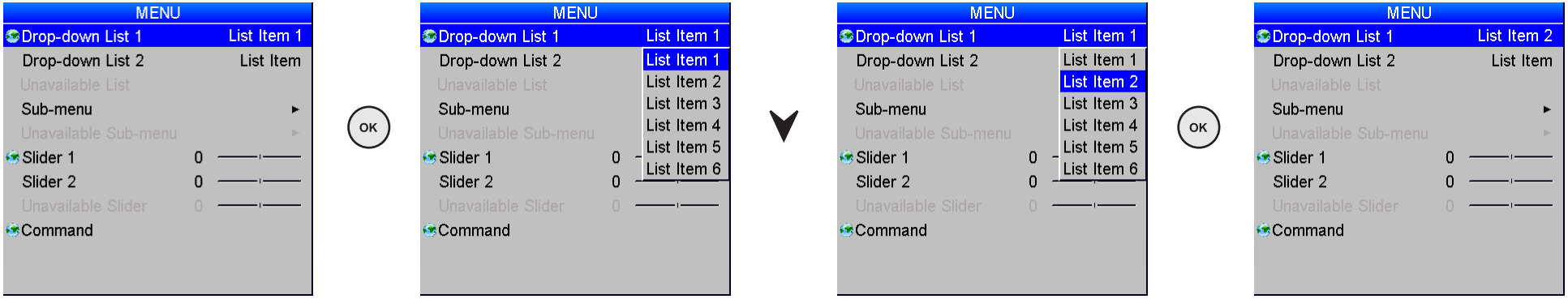
Drop-down lists

To use a drop-down list, press OK, select an item using ▲ and ▼, then press OK again or press EXIT to exit without changing.

Notes

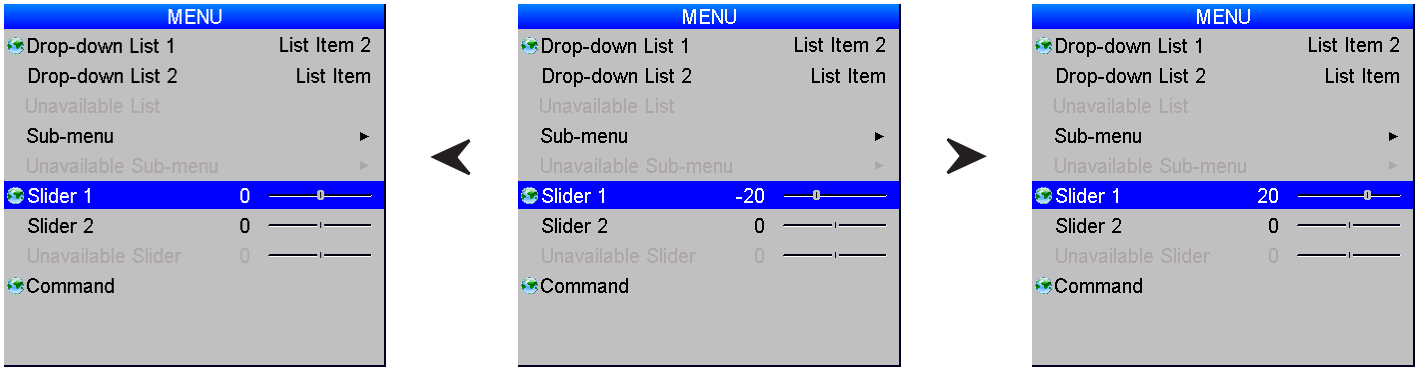
Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

*When **a globe icon** appears next to a setting, the setting affects all sources and all inputs; otherwise, only the current input source will be affected if you change the setting.*



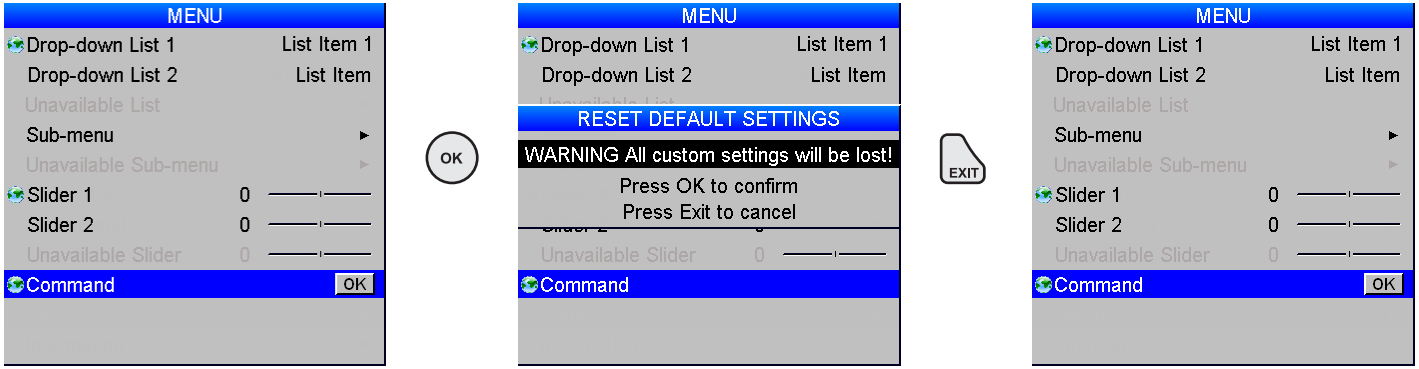
Sliders

To use a slider, press ◄ and ► to adjust it.



Commands

To use a command, press OK. In the example below, press OK to confirm, or press EXIT to cancel.



Notes

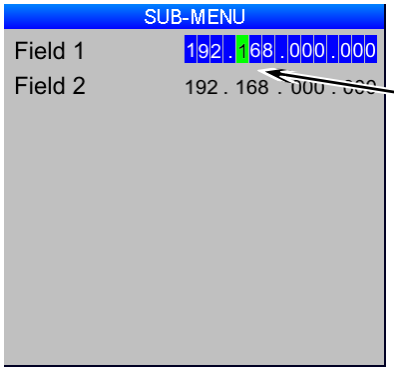
Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

*When **a globe icon** appears next to a setting, the setting affects all sources and all inputs; otherwise, only the current input source will be affected if you change the setting.*

Editing fields

Some features require a text or numeric field to be edited.

- To edit a field, first select it using ▲ and ▼, then press OK.
- Use ◄ and ► to move the green highlight to the digit or character which is to be changed, then use ▲ and ▼ to adjust it.
- Use ◄ and ► to select the next digit or character.
- Press OK to accept the new value, or press EXIT to exit without changing.



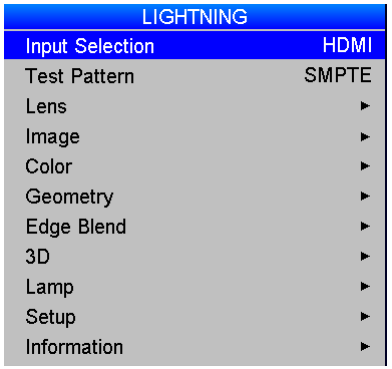
The highlighted digit is being edited

Notes

Some menu items may not be available due to settings in other menus. These will be grayed out on the actual menu.

A Tour Of The Menus

Main menu



- **Input Selection**
  Select an input source from the drop-down list.
- **Test Pattern**
  Set **Input Selection** to **Test pattern** and then select a test pattern from the drop-down list.
- **Lens, Image**, **Color** and **Geometry**
  Open these sub-menus to access various picture and screen settings.
- **Edge Blend / PIP**
  PIP and **Edge Blend** are mutually exclusive modes of operation. When the projector is in Edge Blend mode (as shown in the picture), PIP is not available, and vice versa.
- **3D**
  Access 3D settings.
- **Lamp**
  Adjust lamp power.
- **Setup**
  Adjust Input Configuration, Network, On Screen Display and System settings.
- **Information**
  View your current configuration

Notes

*See also **Using the Menus** earlier in this guide and **Menu Map** later in this guide.*

Main Menu

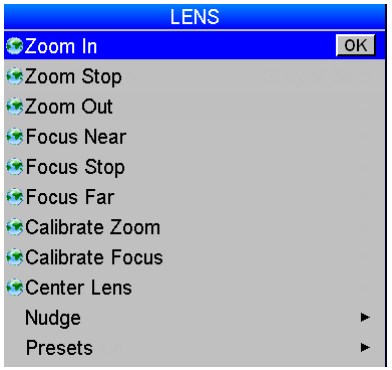
You can also select an input source by pressing the following buttons on the remote control: [1] to [9] for inputs 1 to 9, [10+] for input 10 and [#] for input 11.

Test patterns are subject to image controls, so brightness, contrast etc. will affect their appearance on screen.

Do not use the provided test patterns for P7.

*You can upload custom test patterns using a network connection - see **Web Configuration Utility** later in this guide.*

Lens menu



Zoom

To move the lens in or out:

1. Select **Zoom In** or **Zoom Out**, then press OK.
2. When the image is the desired size, select **Zoom Stop** then press OK.

Focus

To adjust the focus:

1. Select **Focus Near** or **Focus Far**, then press OK.
2. When the image is correctly focussed, select **Focus Stop** then press OK.

Calibrate Zoom and Calibrate Focus

Each time a new lens is fitted into the projector, a calibration procedure must be carried out using these commands.

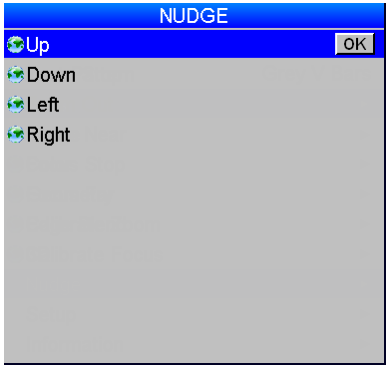
Before you use a newly fitted lens, select **Calibrate Zoom** and **Calibrate Focus** in turn and wait until the projector establishes minimum and maximum travel distances. Select one command and allow at least 60 seconds for the calibration to take place, then select the other command.

Center Lens

To center the lens, select **Center Lens** and press OK.

Nudge

To position the image correctly on the screen, use the **Nudge** controls.



Notes

Main Menu
Lens

You can also move the lens, focus and zoom using the keypad:

- *Press* SHIFT *followed by* ▲, ▼, ◀ *and* ▶ *to shift the lens up, down, left and right.*
- *Press* FOCUS *followed by* ▲ *and* ▼ *to adjust the focus.*
- *Press* ZOOM *followed by* ▲ *and* ▼ *to zoom in and out.*

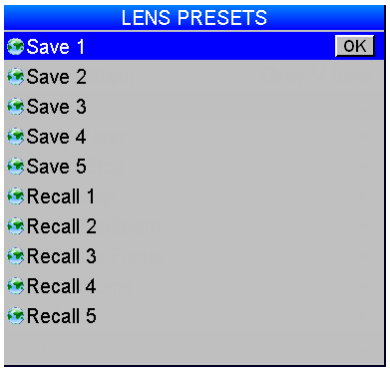
You can also calibrate zoom and focus using the keypad:

- *Press* RPY *followed by* ▶ *to calibrate the lens zoom mechanism.*
- *Press* RPY *followed by* ◀ *to calibrate the lens focus mechanism.*

Main Menu
Lens
Nudge

Lens Presets

This menu allows you to save up to five custom lens presets, which you can recall later.



Notes

Main Menu
Lens
Lens Presets

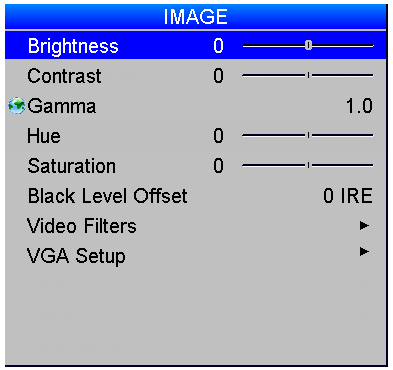
Image menu

- **Brightness**, **Contrast**, **Gamma**, **Hue** and **Saturation**

  Set the slider or select from the drop-down list as required, to improve the quality of the image.

- **Black Level Offset**

  Set this to **0 IRE** or **7.5 IRE** as required.



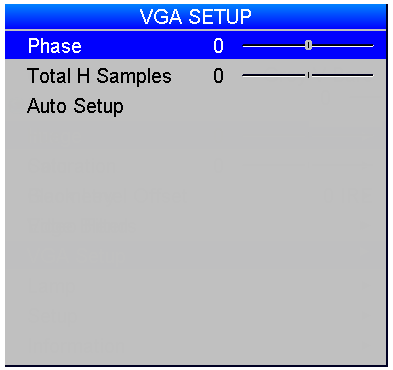
Video Filters

Set the sliders or select from the drop-down list as required, to improve the quality of the image.

VGA Setup

- Set the **Phase** slider to correct for shimmering or poor quality definition on, for example, fine text.
- Set the **Total H Samples** slider to match the resolution of the incoming video signal,

or Use **Auto Setup** to allow the projector to detect the appropriate settings automatically.



Notes

Main Menu
Image

You can also press BRI, CON or SAT on the remote control.

Hue applies only to NTSC signals.

When a new input mode is detected (eg NTSC, HDTV 1080p, SVGA etc), all the **Input Settings** *are saved so that they can be recalled next time that input mode is displayed.*

Main Menu
Image
Video Filters

Main Menu
Image
VGA Setup

VGA Setup is not available unless a VGA signal is present.

Color menu

Gamut

Peak gives you the brightest possible image.

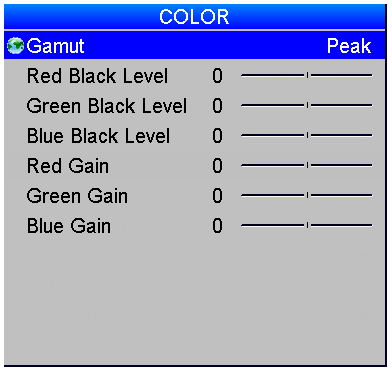
Choose **HDTV** for high definition standards and **SDTV** for standard definition standards.

A value between **3200K** and **9000K** selects the relevant color temperature.

You can upload your own gamut using the Projector Manager software, and then select it from the **User 1** and **User 2** settings.

Black Level and Gain slides

Set the slides as required.



Notes

Main Menu
Color

Geometry menu

- **Aspect Ratio**
  Choose between **Source**, **Fill Display**, **Fill & Crop**, **Anamorphic** and **TheaterScope**.

  *Some devices (eg certain DVD players) pack a 16:9 image into a 4:3 aspect ratio. In such cases to display the image correctly, choose the **Anamorphic** aspect ratio.*

- **Overscan**
  Set this slider to compensate for noisy or badly defined image edges.

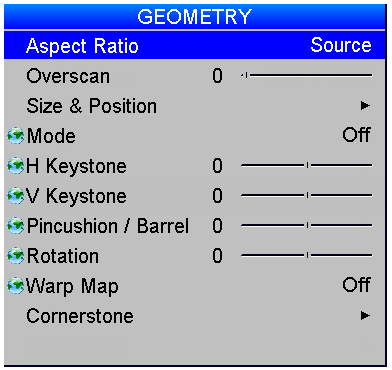
- **Mode**
  Choose from **Keystone**, **Cornerstone**, **Rotation**, **Warp Map** or **Off**.

- Set the **H Keystone** and **V Keystone** sliders to correct for any distortion caused by the projector being in a different horizontal or vertical plane to the screen.

- Set the **Pincushion / Barrel** slider to correct for any distortion caused by the screen being concave or convex.

- Set the **Rotation** slider to rotate the image on the screen.

- **Warp Map**
  Using an external Digital Projection computer application, up to eight customised warp maps can be created and uploaded to the projector. If **Warp** is selected, and any warp maps have been uploaded, you can select from the drop-down list.



Notes

Main Menu
Geometry

*An **anamorphic lens** (optional accessory) is used with the **TheaterScope** setting, to ensure that for a **2.35:1** image, the maximum area of the DMD is used, giving maximum image brightness.*

*For examples of how the different aspect ratios affect screen dimensions, see **Aspect Ratios Explained** in the **Reference Guide**.*

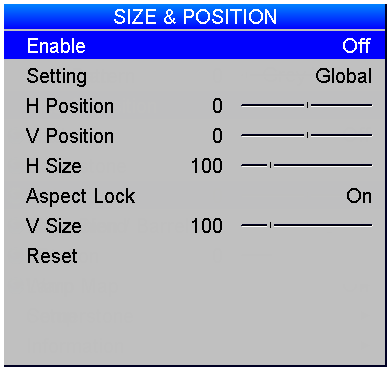
Size & Position

- Set **Enable** to **On** or **Off**.
- Use **Setting** to choose:

  Global, in which case these settings will be applied to all signals on all inputs.

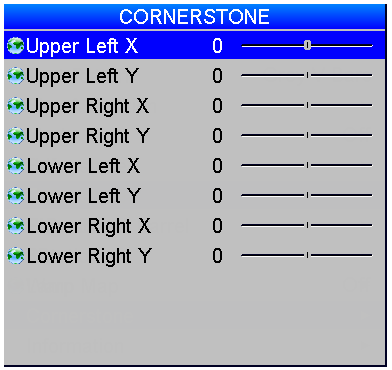
or **Per Mode**, in which case these settings will be applied only to the current input signal.

- Set the **H Position** and **V Position** sliders as required.
- Set **H Size** and **V Size**. When **Aspect Lock** is set to **On**, the **V Size** slider is disabled.
- Select **Reset** and press OK to reset all the sliders.



Cornerstone

If **Cornerstone** is selected from the main **Geometry** page, you can use the sliders to stretch the image from each of the four corners.



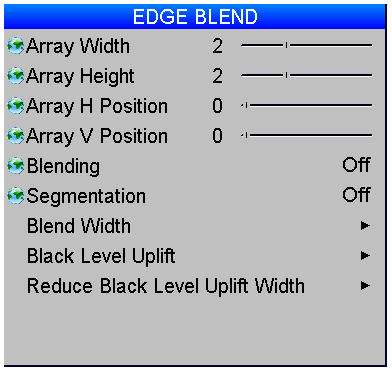
Notes

Main Menu
Geometry
Size & Position

Main Menu
Geometry
Cornerstone

Edge Blend menu

When several projectors are used to create a large tiled image, the edges need to be blended to avoid the overlaps appearing brighter than the rest of the image. The Edge Blend menu is available only when **Setup** > **System** > **Configuration** is set to **Edge Blend**.



Array Width and Height

- Set this to the total number of projectors in the array. None of the other options are available until one of these two settings is greater than **1**. The maximum number of projectors is **4** x **4**.

Array H Position and V Position

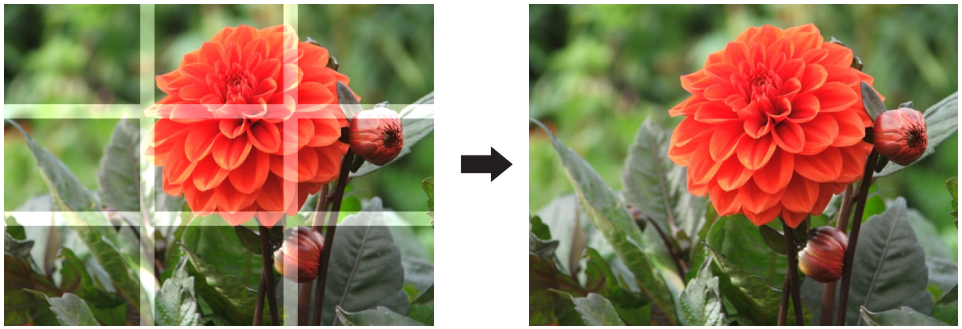
- These two parameters need to be set correctly for each projector in the array, so that it can determine which edges are to be blended. Sometimes only one edge overlaps, sometimes two, three or four.

Blending

- Set this to **Off** for a lone projector, **On** to enable Edge Blending, or **Align Pattern** to help adjust the physical position of the projectors.

Segmentation

- Set this to **On**, if you want the projector to divide up the image into tiles, or **Off** if you have external equipment to do this.



Notes

Main Menu
Edge Blend

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **Edge Blend**.

None of the other blend options are available until either the ***Array Width*** *or the* ***Array Height*** *setting is greater than* **1**.

Note that the position numbering starts from zero, so the top left projector is at position ***H 0, V 0***.

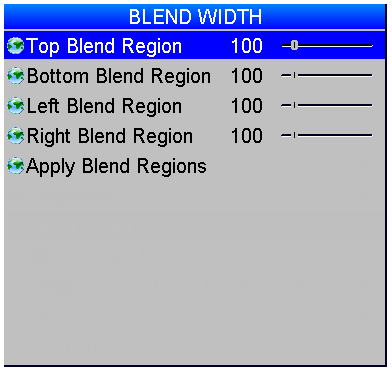
Which settings are available in these menus depends on:

- *the number of projectors in the array*
- *the position of the projector in the array*

For additional information, see the ***Reference Guide***.

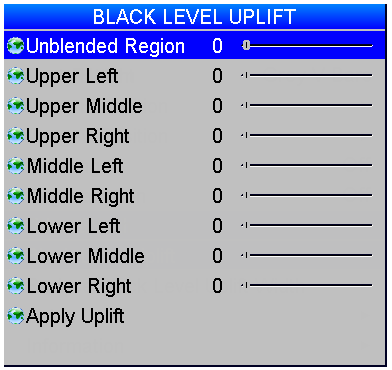
Blend Width

- Use this to set the width of the blended regions.



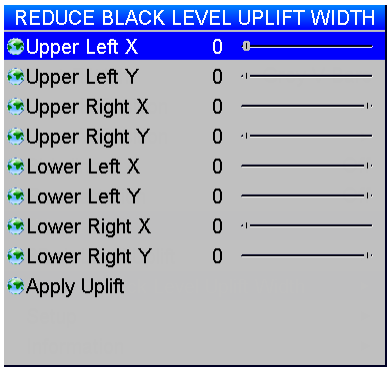
Black Level Uplift

- Use this to correct for non-zero black levels in the blended regions.



Reduce Black Level Uplift Width

- Use this to correct for stray light from the DMD's non-addressable border.



Notes

To apply the settings in these menus, use the command at the bottom of each page.

Main Menu
Edge Blend
Blend Width

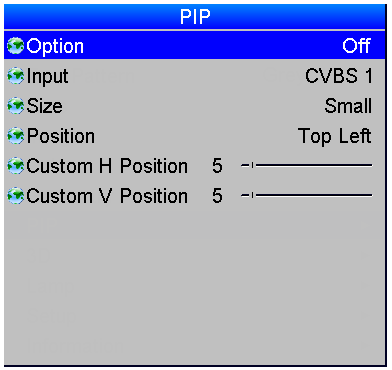
Main Menu
Edge Blend
Black Level Uplift

*For additional information, see the **Reference Guide**.*

Main Menu
Edge Blend
Reduce Black Level Uplift Width

PIP menu

Two images can be combined, in three different ways using this feature. The PIP menu is available only when **Setup** > **System** > **Configuration** is set to **PIP**.



Option

- Select **PIP**, **PAP**, or **POP** mode from the drop-down list.

Input

- Select an **Input** from the drop-down list. The inputs are divided into two groups – the main image must be from one group, and the sub-image must be from the other group.
  - Group A: **CVBS 1, CVBS 2**, **S-VIDEO** and **3G-SDI**
  - Group B: **COMPONENT, VGA**, **DVI**, **HDMI** and **DVI-A**

Size

- Select a size for the sub-image from the drop-down list.

Position

- Select one of the preset positions for the sub-image from the drop-down list.

Custom Position

- If you have chosen **Custom** from the **Position** drop-down list, then you can use the sliders to position the image manually.

PIP: Picture In Picture

PAP: Picture And Picture

POP: Picture Opposite Picture

Notes

Main Menu
PIP

This menu is available only when **Setup** > **System** > **Configuration** *is set to* **PIP**.

PIP, **PAP** *and* **POP** *are NOT possible when* **Input** *is set to* **Test Pattern**.

In these examples, the flower is the main image, and the window is the sub-image, shown at the **Medium** *size setting.*

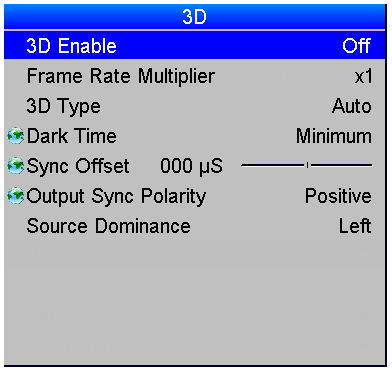
The two images MUST be from different **Input groups**.

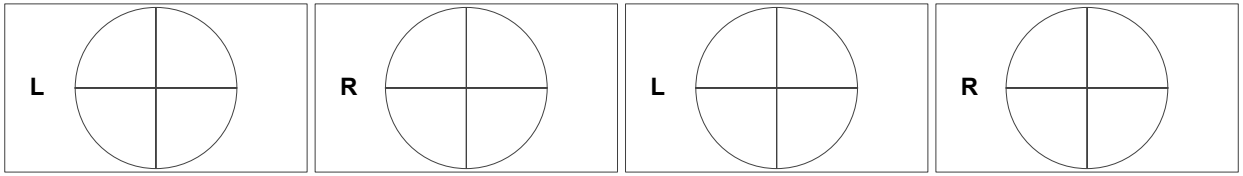
The **Position** *settings apply ONLY to* **PIP** *mode. PAP and POP are always as shown in these examples.*

3D menu

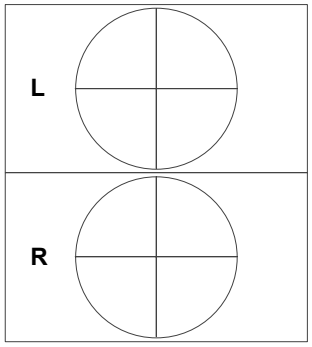
- Set **3D Enable** to **On** or **Off** as required.
- Use the **Frame Rate Multiplier** to reduce flicker when the incoming 3D video signal has a low frame rate.

  For example, a 48Hz frame rate could be tripled to 144Hz.
- **3D Type** should be set to **Auto**, except when the projector has problems selecting between **Sequential**, **Frame Packing**, **Top and Bottom** and **Side by Side (Half)**.
- Set the **Dark Time** to reduce the ghosting that can be caused by the images overlapping whilst the glasses are switching.
- Set the **Sync Offset** to compensate for signal processing delays in the projector.
- Set the **Output Sync Polarity** to suit the glasses, or if the left and right images appear to be swapped.
- Set **Source Dominance** to **Left** or **Right** to suit the incoming 3D video signal.

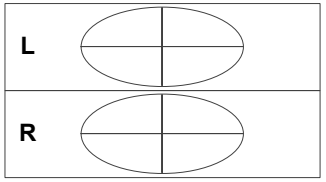




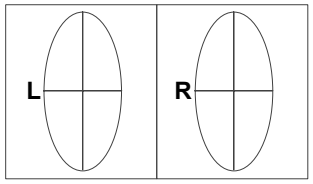
Sequential



Frame Packing



Top-and-Bottom



Side-by-Side (Half)

Notes

Main Menu
3D

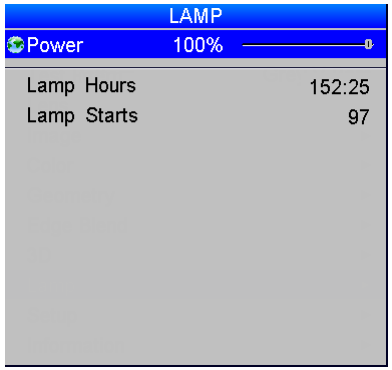
*Set the **Dark Time** to the value appropriate to the glasses or ZScreen.*

*Adjust the **Sync Offset** to eliminate ghosting and achieve a smooth grayscale.*

*For additional information on 3D settings, see the **Reference Guide**.*

Lamp menu

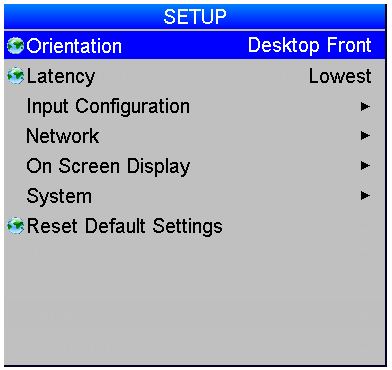
Set the slider to vary the **Power** between 60% and 100%.



Notes

Main Menu
Lamp

Setup menu



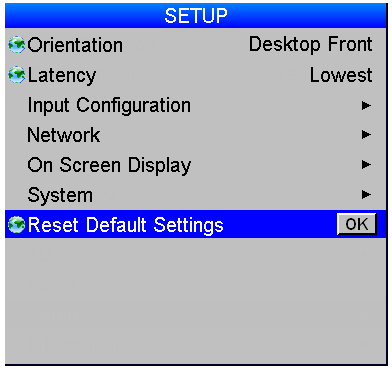
- **Orientation**

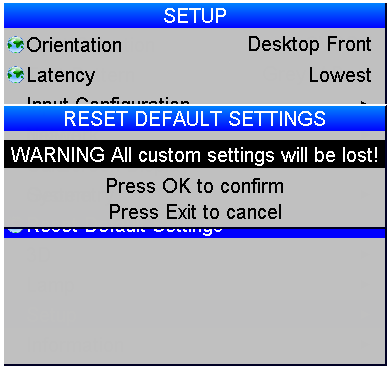
  Depending on how the projector is mounted, select the appropriate setting from the drop-down list.

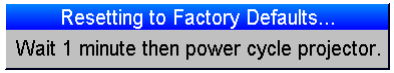
- **Latency**

  Affects interlaced sources only. For fastest response, the **Lowest** setting gives minimum frame delay. For improved performance with films involving motion sequences, the **Best Video** setting uses adaptive de-interlacing and interpolation, but takes longer to process.

Reset Default Settings







When you press OK to restore the factory default settings, a warning message appears, asking you to confirm or cancel.

Once the process has begun, wait one minute and then power cycle the projector so the restored settings can take effect.

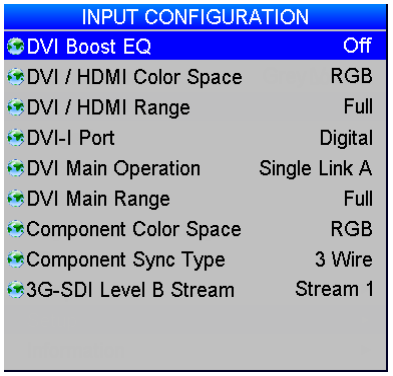
Notes

Main Menu
Setup

Do NOT do this unless you are sure that you want to restore ALL the current settings to their factory defaults.

Input Configuration

This menu allows adjustment of various technical parameters specific to each of the signal inputs, regardless of which input is being used.


INPUT CONFIGURATION
DVI Boost EQ Off
DVI / HDMI Color Space RGB
DVI / HDMI Range Full
DVI-I Port Digital
DVI Main Operation Single Link A
DVI Main Range Full
Component Color Space RGB
Component Sync Type 3 Wire
3G-SDI Level B Stream Stream 1

- **DVI Boost EQ** should normally be set to **Off,** except when you are having problems with a long DVI cable.
- **DVI/HDMI Color Space** should normally be set to **Auto**, except when the projector has problems identifying the correct colour space.
- **DVI/HDMI Range** should normally be set to **Auto**, except when you are having contrast problems with some DVI sources.
- Set **DVI-I Port** to choose between the **Analog** and **Digital** signals from a DVI-I source.
- **DVI Main Operation**
  Select between single and dual link DVI reception.
- **DVI Main Range**
  Select between **Full** and **Limited** range.
- Set **Component Colour Space** to choose between **RGB** and **YPbPr**.
- **Component Sync Type** should be set to **Auto**, except when the projector has problems selecting between **3 Wire** (RGsB) and **4 Wire** (RGBS).
- If two video streams are being transmitted, use **3G-SDI Level B Stream** to choose between the two streams.

Notes

Main Menu
Setup
Input Configuration

Network

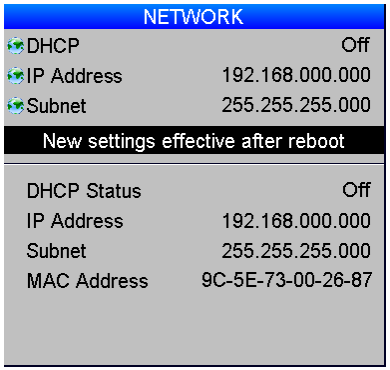
The fields at the bottom of the menu show the current settings.

- Set **DHCP** to **On** if the IP Address is to be assigned by a DHCP server, or **Off** if it is to be set here.
- If **DHCP** is set to **On:**

  It will not be possible to edit either IP Address or Subnet.
- If **DHCP** is set to **Off:**

  Edit **IP Address** to the correct value.

  Edit the **Subnet** to the correct value.



Notes

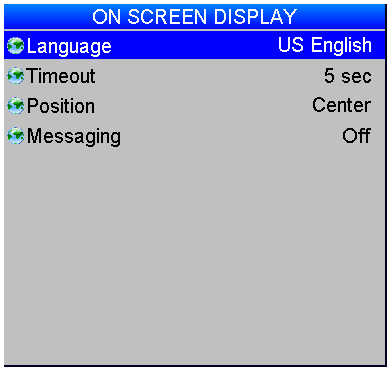
Main Menu
Setup
Network

Any new settings will not be effective until the projector has been power cycled.

On Screen Display

- Select a display **Language** from the drop-down list.
- The menus will disappear if no buttons are pressed within the **Timeout** selected from the drop-down list. If you want the menus to stay on screen permanently, then select **Infinite**.
- Select a **Position** from the drop-down list.
- If you do not want projector status messages to be displayed, for instance

, then set **Messaging** to **Off**.



Notes

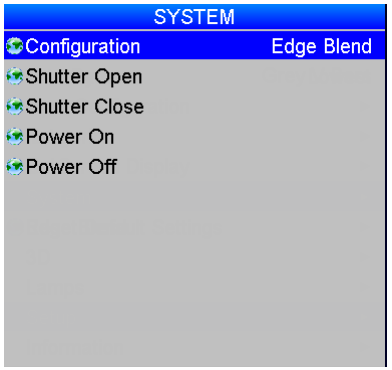
Main Menu
Setup
On Screen Display

System

- **Configuration**: switch between **PIP** and **Edge Blend**.

The other settings in this menu are provided mainly to allow control from the Web Configuration Utility.

- Use the **Shutter Open** and **Shutter Close** commands as required.
- Use the **Power Off** command to set the projector into **Standby** mode.



Notes

Main Menu
Setup
System

When you switch between **PIP** *and* **Edge Blend**, *the projector will reboot instantly to enable the new setting.*

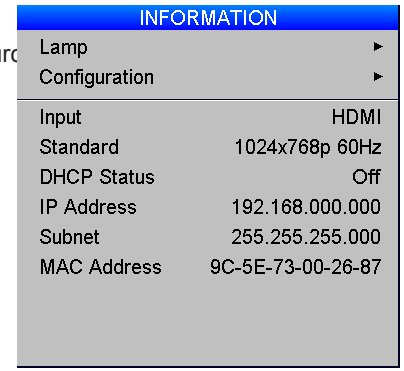
The **Power On** *command has no function when seen on the projector OSD.*

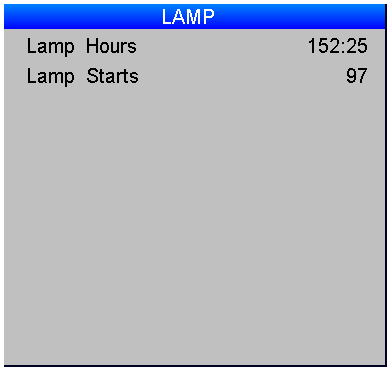
However, it can be used from the ***Web Configuration Utility*** *described at the end of this guide.*

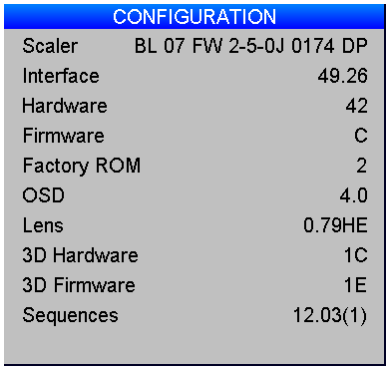
Both the keypad and remote control have dedicated buttons allowing access to the **Shutter Open**, **Shutter Close**, **Power On** *and* **Power Off** *commands.*

Information menu

This menu gives information about lamp operating times, software and hardware configuration, input sourc







Notes

Please note that the values shown in the menus on this page are examples and may differ significantly on your OSD.

Main Menu
Information

Main Menu
Information
Lamps

Main Menu
Information
Configuration

The configuration shown here is for a 3D model.

Menu Map

Main Menu — ***Sub Menus***

Input Selection

CVBS 1, CVBS 2, S-Video, Component, VGA, 3G-SDI, DVI, HDMI, Test Pattern, Main/DVI, Sub/HDMI, Dual Pipe

Test Pattern

Gray V Bars, Gray H Bars, Aspect Test, Alignment Grid, Warp Adjust, SMPTE, Chequerboard, White Field, Black Field, Convergence, Custom 1, Custom 2, Custom 3, Custom 4.

Lens

Zoom In *(command)*
Zoom Stop *(command)*
Zoom Out *(command)*
Focus Near *(command)*
Focus Stop *(command)*
Focus Far *(command)*
Calibrate Zoom *(command)*
Calibrate Focus *(command)*
Center Lens (command)
Nudge
- Up *(command)*
- Down *(command)*
- Left *(command)*
- Right *(command)*

Lens Presets
- Save 1 *(command)*
- Save 2 *(command)*
- Save 3 *(command)*
- Save 4 *(command)*
- Save 5 *(command)*
- Recall 1 *(command)*
- Recall 2 *(command)*
- Recall 3 *(command)*
- Recall 4 *(command)*
- Recall 5 *(command)*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Main Menu	*Sub Menus*
Image	
	Brightness *(slider, value range -50 ~ 50 [0])*
	Contrast *(slider, value range -50 ~ 50 [0])*
	Gamma *1.0 , 1.8, 2.0, 2.2, 2.4, 2.6, 2.8*
	Hue *(slider, value range -50 ~ 50 [0])*
	Saturation *(slider, value range -50 ~ 50 [0])*
	Black Level Offset *0 IRE, 7.5 IRE*
	Video Filters
	Sharpness *(slider, value range -50 ~ 50 [0])*
	Detail *(slider, value range 0 ~ 3)*
	Luma Sharpness *(slider, value range 0 ~ 2)*
	Chroma Sharpness *(slider, value range 0 ~ 2)*
	Recursive NR *(slider, value range 0 ~ 3)*
	Mosquito NR *(slider, value range 0 ~ 3)*
	Cross Color Supression *Off, On*
	VGA Setup
	Phase *(slider, value range -50 ~ 50 [0])*
	Total H Samples *(slider, value range -50 ~ 50 [0])*
	Auto Setup *(command)*
Color	
	Gamut *Peak, HDTV, SDTV, 3200k, 5400k, 6500k, 8000k, 9000k, User 1, User 2*
	Red Black Level *(slider, value range -50 ~ 50 [0])*
	Green Black Level *(slider, value range -50 ~ 50 [0])*
	Blue Black Level *(slider, value range -50 ~ 50 [0])*
	Red Gain *(slider, value range -50 ~ 50 [0])*
	Green Gain *(slider, value range -50 ~ 50 [0])*
	Blue Gain *(slider, value range -50 ~ 50 [0])*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Main Menu ***Sub Menus***

Geometry

Aspect Ratio Source, *Fill Display, Fill & Crop, Anamorphic, TheaterScope*

H Position *(slider, value range -50 ~ 50 [0])*

V Position *(slider, value range -50 ~ 50 [0])*

Overscan *(slider, value range 0 ~ 3)*

Size & Position

- Enable Off, On
- Setting Global, Per Mode
- H Position *(slider, value range -100 ~ 100 [0])*
- V Position *(slider, value range -100 ~ 100 [0])*
- H Size *(slider, value range 25 ~ 400 [100])*
- Aspect Lock On, Off
- V Size *(slider, value range 25 ~ 400 [100])*
- Reset *(command)*

Mode Off, *Keystone, Cornerstone, Rotation, Warp*

Keystone

- H Keystone *(slider, value range -50 ~ 50 [0])*
- V Keystone *(slider, value range -50 ~ 50 [0])*
- Pincushion / Barrel *(slider, value range 30 ~ 30 [0])*

Cornerstone

- Upper Left X *(slider, value range -500 ~ 500 [0])*
- Upper Left Y *(slider, value range -500 ~ 500 [0])*
- Upper Right X *(slider, value range -500 ~ 500 [0])*
- Upper Right Y *(slider, value range -500 ~ 500 [0])*
- Lower Left X *(slider, value range -500 ~ 500 [0])*
- Lower Left Y *(slider, value range -500 ~ 500 [0])*
- Lower Right X *(slider, value range -500 ~ 500 [0])*
- Lower Right Y *(slider, value range -500 ~ 500 [0])*

Rotation

- Rotation *(slider, value range --90 ~ 90 [0])*
- Pincushion / Barrel *(slider, value range -30 ~ 30 [0])*

Warp Map Off, *1, 2, 3, 4, 5, 6, 7, 8*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Main Menu	*Sub Menus*

Edge Blend

Array Width *(slider, value range 1 ~ 4)*

Array Height *(slider, value range 1 ~ 4)*

Array H Position *(slider, value range 0 ~ 3)*

Array V Position *(slider, value range 0 ~ 3)*

Blending Off, On, Align Pattern

Segmentation Off, On

Blend Width

- Top Blend Region *(slider, value range 0 ~ 999)*
- Bottom Blend Region *(slider, value range 0 ~ 999)*
- Left Blend Region *(slider, value range 0 ~ 999)*
- Right Blend Region *(slider, value range 0 ~ 999)*
- Apply Blend Regions *(command)*

Black Level Uplift

- Unblended Region *(slider, value range 0 ~ 63)*
- Upper Left *(slider, value range 0 ~ 63)*
- Upper Middle *(slider, value range 0 ~ 63)*
- Upper Right *(slider, value range 0 ~ 63)*
- Middle Left *(slider, value range 0 ~ 63)*
- Middle Right *(slider, value range 0 ~ 63)*
- Lower Left *(slider, value range 0 ~ 63)*
- Lower Middle *(slider, value range 0 ~ 63)*
- Lower Right *(slider, value range 0 ~ 63)*
- Apply Uplift *(command)*

Reduce Black Level Uplift Width

- Upper Left X *(slider, value range 0 ~ 200)*
- Upper Left Y *(slider, value range 0 ~ 200)*
- Upper Right X *(slider, value range -200 ~ 0)*
- Upper Right Y *(slider, value range 0 ~ 200)*
- Lower Left X *(slider, value range -200 ~ 0)*
- Lower Left Y *(slider, value range -200 ~ 0)*
- Lower Right X *(slider, value range 0 ~ 200)*
- Lower Right Y *(slider, value range -200 ~ 0)*
- Apply Uplift *(command)*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

PIP *and* **Edge Blend** *are mutually exclusive modes of operation. When in PIP mode, Edge Blend is not available, and vice versa.*

Main Menu	*Sub Menus*
PIP	
	Option *Off, PIP, PAP, POP*
	Input *CVBS 1, CVBS 2, S-Video, Component, VGA, 3G-SDI, DVI, HDMI*
	Size *Small, Medium, Large*
	Position *Top Left, Top Right, Bottom Left, Bottom Right, Custom*
	Custom H Position *(slider, value range 0 ~ 100 [50])*
	Custom V Position *(slider, value range 0 ~ 100 [50])*
3D	
	3D Enable *Off, On*
	Frame Rate Multiplier *x1, x2, x3*
	3D Type *Auto, Sequential, Frame Packing, Top-and-Bottom, Side-by-Side (Half)*
	Dark Time *Minimum, 650 µS, 1300 µS, 7500 µS*
	Sync Offset *(slider, value range -15 ~ 15 [0])*
	Output Sync Polarity *Positive, Negative*
	Source Dominance *Left, Right*
Lamp	
	Power *(slider, value range 60 — 100)*
	Information: Lamp 1 Hours, Lamp 1 Starts

Notes

- *Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.*
- *The underlined text represents the factory default value for each setting.*
- **PIP** *and* **Edge Blend** *are mutually exclusive modes of operation. When in PIP mode, Edge Blend is not available, and vice versa.*

Main Menu ***Sub Menus***

Setup

Orientation Desktop Front, *Desktop Rear, Ceiling Front, Ceiling Rear*

Latency Lowest, *Best Video*

Input Configuration

- DVI Boost EQ Off, *On*
- DVI / HDMI Color Space RGB, *YPbPr, Auto*
- DVI / HDMI Range Full, *Limited, Auto*
- DVI-I Port Digital, *Analog*
- DVI Main / Sub Operation Single Link A, *Single Link B, Dual Link*
- DVI Main / Sub Range Full, *Limited*
- Component Color Space RGB, *YPbPr*
- Component Sync Type 3 Wire, *4 Wire, Auto*
- 3G-SDI Level B Stream Stream 1, *Stream 2*

Network

- DHCP Off, *On*
- IP Address (*numeric input)*
- Subnet (*numeric input)*
- *Information: DHCP Status, IP Address, Subnet, MAC Address*

On Screen Display

- Language US English, *UK English*
- Timeout 5 sec, *10 Sec, 15 sec, 20 sec, 25 sec, 30 sec, infinite*
- Position Center, *Top Left, Top Right, Bottom Left, Bottom Right*
- Messaging Off, *On*

System

- Configuration PIP, *Edge Blend*
- Shutter Open *(command)*
- Shutter Close *(command)*
- Power On *(command)*
- Power Off *(command)*

Reset Default Settings *(command)*

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

The underlined text represents the factory default value for each setting.

Do NOT reset the settings unless you are sure that you want to restore ALL the current settings to their factory defaults.

Main Menu	*Sub Menus*
Information	
	Lamp
	Lamp 1 Hours, Lamp 1 Starts
	Configuration
	Scaler, Interface, Hardware, Firmware, Factory ROM, OSD, Lens, 3D Hardware, 3D Firmware, Sequences Input, Standard, DHCP Status, IP Address, Subnet, MAC Address

Notes

Some of the information in this menu map is summarised. See the actual menu on the projector for full detail.

Web Configuration Utility

The ***LAN IP Address*** of the projector can be set by using the **Network** submenu, which can be found in the **Setup** menu.

Once the LAN IP Address has been set, it is possible to control all the functions available on the OSD by using the embedded Web Configuration Utility.

To access the Web Configuration Utility, do one of the following:

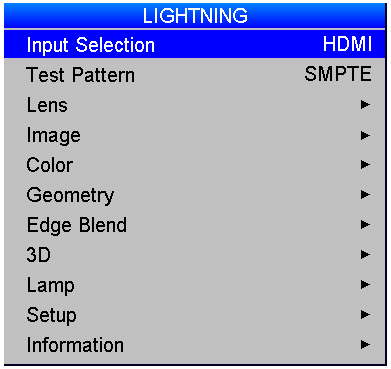
- Type the URL ***http://<LAN IP Address>*** into the address bar of your browser, then press **ENTER**.
- Use the *DiscoveryTool_V1.0.exe* application as described in ***Using the Discovery Tool to view your network*** later in this section.

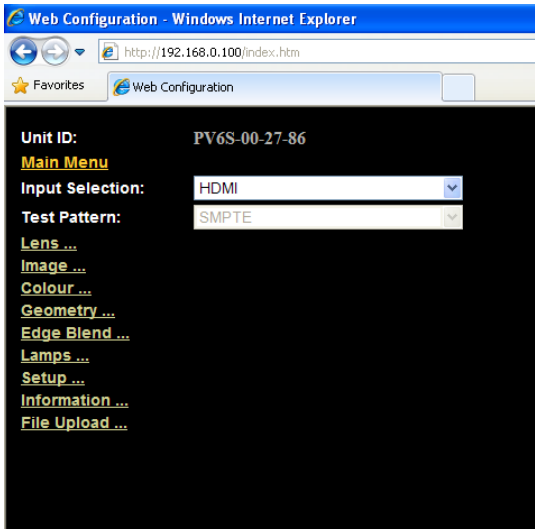
The embedded webpage shown below right should appear.

Menu examples

The webpages mirror the OSD menus, as shown in the following examples:

- The last 3 bytes of the projector's ***MAC Address*** are shown in the **Unit ID**, ***00-27-86*** in the example shown here.
- The menu name is shown in orange underlined text, as in the **Main Menu** shown here.
- Drop-down lists are represented by similar drop-down lists, as in the **Input Selection** list shown here.
- Sub-menus are represented by yellow underlined links, as shown here.



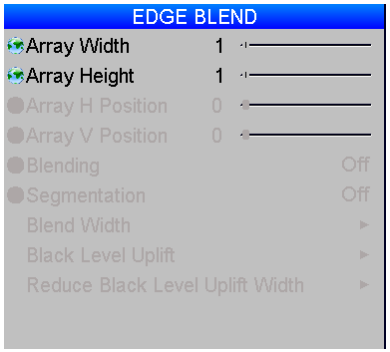


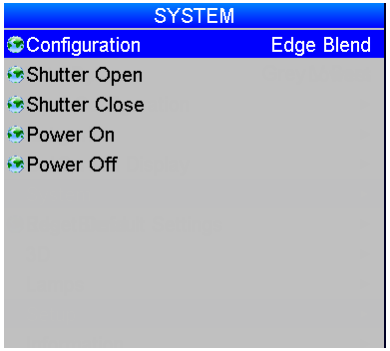
Notes

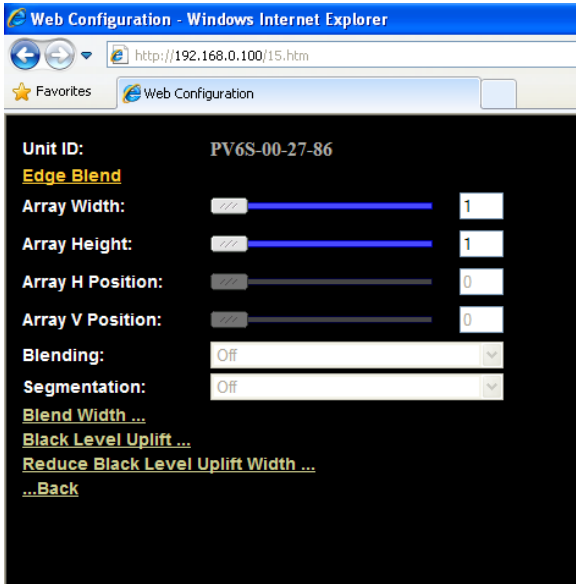
For full details of how to use the menu system, see earlier in this Guide.

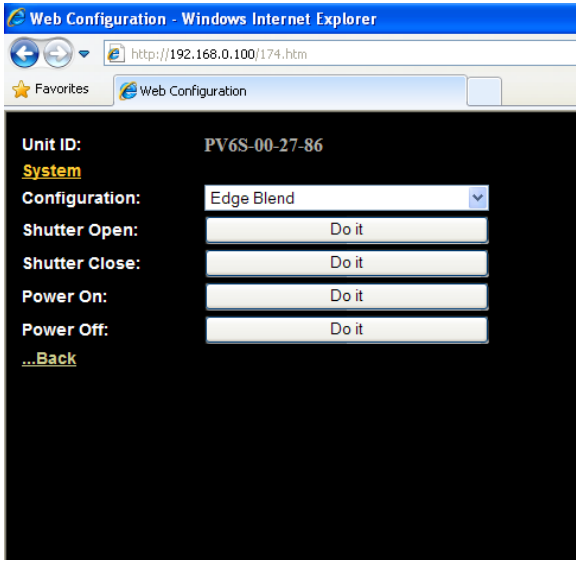
Examples (continued)

- Sliders are represented by similar sliders, as in the **Array Width** and **Array Height** sliders shown here.
- Items that are not available are shown grayed-out, as shown here.
- To return from a sub-menu to the previous menu, click on the **Back** link at the bottom of the menu.
- Commands are represented by **Do it** buttons, as shown here.









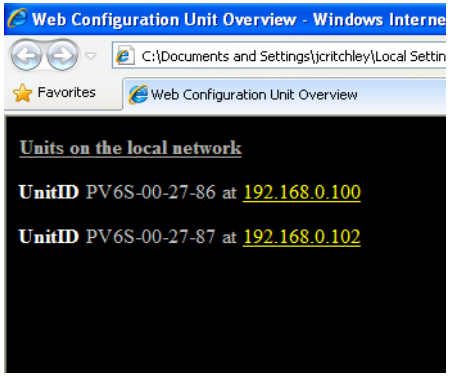
Notes

For full details of how to use the menu system, see earlier in this Guide.

Using the Discovery Tool to view your network

The Discovery Tool allows you to view the IP addresses of all projectors in your network.

The tool opens the following page in your browser:


Web Configuration Unit Overview - Windows Interne
C:\Documents and Settings\jcritchley\Local Settin
Favorites
Web Configuration Unit Overview
Units on the local network
UnitID PV6S-00-27-86 at 192.168.0.100
UnitID PV6S-00-27-87 at 192.168.0.102

Click on a projector IP address to access the Web Configuration Utility for that projector.

Notes

The tool will only find projectors from the same subnet as the host computer. The IP addresses of these projectors will be identical up to the third octet as shown in the example.

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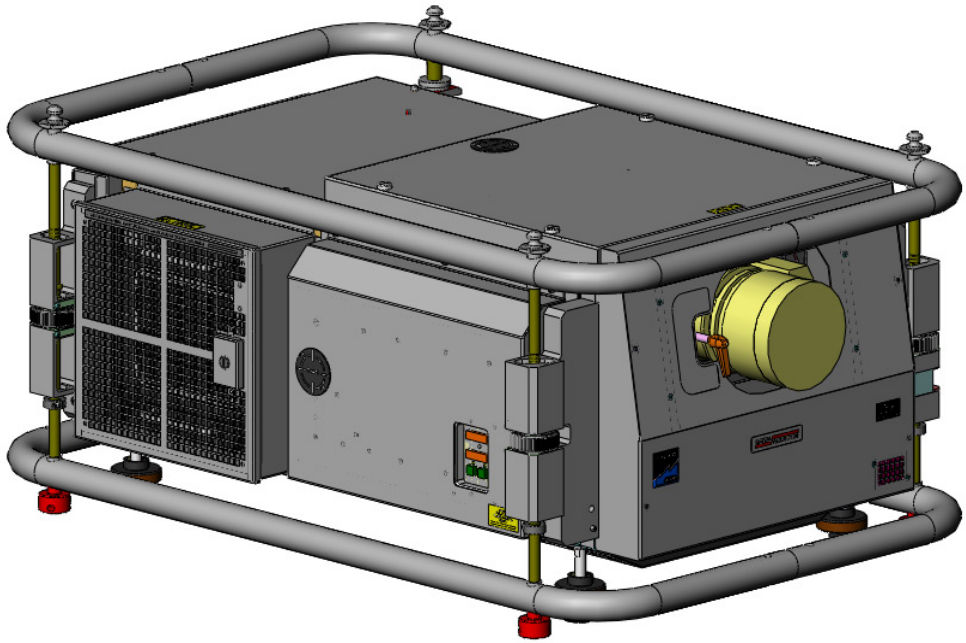

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Introduction

The projector can be controlled by using an external control system or a PC via an RS232 or LAN interface, using a terminal-emulation program, such as HyperTerminal.

Network setup

1. Connect the projector to a network via an RS232 or LAN interface.

   See ***Connection Guide > Control Connections*** for details.

2. Open the **Setup > Network** menu and edit network settings. The default IP address is **192.168.0.100** and the TCP port number is **7000**.

   See ***Operating Guide > A Tour Of The Menus > Setup menu > Network*** for details on changing network settings.

Serial Port settings

- Baud rate 9,600 bps
- Data length 8 bits
- Stop bits one
- Parity none
- Flow control none

Notes

Remote communications commands

Commands are used to simulate menu operations and determine the settings of the projector, and use the following format:

- All commands consist of ASCII text strings starting with an asterisk∗ and ending with an ASCII Carriage Return character↵ (code 13): **`*command operator <value>`**↵
- The **`<command>`** string determines which setting the command will affect.
- Spaces are required before the operator and before the value.
- The **`<operator>`** string can take one of the following formats:

Operator type	<operator>	Description
Set	`= <value>`	Makes the setting take the `<value>`.
Get	`?`	Asks what the current value is. The value is returned as an ASCII text string.
Execute		Performs an action. No operator is entered for this type of command.

Examples

`*aspect.ratio = 4`↵ sets the aspect ratio to TheaterScope

`*aspect.ratio ?`↵ asks what is the current aspect ratio

`*lens.stop`↵ commands the projector to stop any lens movement that is currently in progress

`*aspect.ratio=4`↵ is an invalid instruction because of the missing spaces before the operator and the value

Notes

To set the default value of a command, simply enter the command name and ↵, without an operator. For example `*aspect.ratio`↵ *will set the aspect ratio to 0 (Source).*

The projector response begins with "ACK", to show your input has been acknowledged.
For example, if you send `*aspect.ratio = 1`, *the projector will return* `ACK aspect.ratio = 1` *and will change the aspect ratio accordingly.*
If your command has not been acknowledged, due to a syntax error or another problem, the projector response will be `NAK`.

Command Guide

<command>	<operator>	<values>
Input Selection menu		
`input`	`= ?`	0 = CVBS 1 1 = CVBS 2 2 = S-Video 3 = Component 4 = VGA 5 = 3G-SDI 6 = DVI 7 = HDMI 8 = Test Pattern 9 = Main/DVI (3D models only) 10 = Sub/HDMI (3D models only) 11 = Dual Pipe (3D models only)
Test Pattern menu		
`test.pattern`	`= ?`	0 = Grey V Bars 1 = Grey H Bars 2 = Aspect Test 3 = Alignment Grid 4 = Warp Adjust 5 = SMPTE 6 = Checkerboard 7 = White Field 8 = Black Field 9 = Screen Layout
continued on next page...		

Notes

The `test.pattern` *operation is only accessible if the* `input` *operation is set to 8 (Test Pattern):*
`*input = 8[CR]`

<command>	<operation>	<values>
Lens menu		
zoom.in	(execute)	
zoom.out	(execute)	
focus.near	(execute)	
focus.far	(execute)	
calibrate.zoom	(execute)	
calibrate.focus	(execute)	
lens.centre	(execute)	
nudge.up	=	Nudge time, 0 = shortest, 3 = longest
nudge.down	=	Nudge time, 0 = shortest, 3 = longest
nudge.left	=	Nudge time, 0 = shortest, 3 = longest
nudge.right	=	Nudge time, 0 = shortest, 3 = longest
lensmemory.save	=	0 - 9 (integer)
lensmemory.recall	=	0 - 9 (integer)
lens.up	=	0 - 3 (integer)
lens.down	=	0 - 3 (integer)
lens.left	=	0 - 3 (integer)
lens.right	=	0 - 3 (integer)
lens.stop	(execute)	

continued on next page...

Notes

The lens.stop *operation stops all lens movement. All lens commands except* nudge *will continue to move until this command is sent or the limit is reached. Use* nudge *to produce a brief movement of the lens in the specified direction.*

<command>	<operation>	<values>
Image menu		
brightness	= ?	-50 to 50 (integer)
contrast	= ?	-50 to 50 (integer)
gamma	=	0 = 1.0 1 = 1.8 2 = 2.0 3 = 2.2 4 = 2.4 5 = 2.6 6 = 2.8
hue	= ?	-50 to 50 (integer)
saturation	= ?	-50 to 50 (integer)
blacklevel.offset	= ?	0 = 0 IRE, 1 = 7.5 IRE
sharpness	= ?	-50 to 50 (integer)
detail	= ?	0 to 100
luma.sharpness	= ?	0 = Off 1 = Low 2 = High
chroma.sharpness	= ?	0 = Off 1 = Low 2 = High
recursive.nr	= ?	0 = Off 1 = Low 2 = Medium 3 = High
mosquito.nr	= ?	0 = Off 1 = Low 2 = Medium 3 = High
ccs	= ?	0 = Off 1 = On
vga.phase	= ?	-15 to 15 (integer)

continued on next page...

Notes

The ccs *operation is identical to the* ***Cross Color Supression*** *setting in the* ***Image > Video Filters*** *menu.*

The vga.phase *operation is identical to the* ***Phase*** *setting in the* ***Image > VGA Setup*** *menu.*

<command>	<operation>	<values>
vga.samples	= ?	0 to 1444 (integer)
vga.auto	(execute)	
Color menu		
gamut	= ?	0 = Peak 1 = HDTV 2 = SDTV 3 = 3200K 4 = 5400K 5 = 6500K 6 = 8000K 7 = 9000K 8 = User 1 9 = User 2
red.lift	= ?	-50 to +50 (integer)
green.lift	= ?	-50 to +50 (integer)
blue.lift	= ?	-50 to +50 (integer)
red.gain	= ?	-50 to +50 (integer)
green.gain	= ?	-50 to +50 (integer)
blue.gain	= ?	-50 to +50 (integer)

continued on next page...

Notes

The vga.samples *operation is identical to the* ***Total H Samples*** *setting in the* ***Image > VGA Setup*** *menu.*

The vga.auto *operation is identical to the* ***Auto Setup*** *command in the* ***Image > VGA Setup*** *menu.*

gamut *sends a selection of factory set target data or the two user tables defined by* tcgd1.data *and* tcgd2.data*. See* ***Miscellaneous commands*** *below.*

<command>	<operation>	<values>
Geometry menu		
aspect.ratio	= ?	0 = Source 1 = Fill & Display 2 = Fill & Crop 3 = Anamorphic 4 = Theatrescope
overscan	= ?	0 = 0% 1 = 2.5% 2 = 5% 3 = 7.5%
sizepos.enable	= ?	On, Off
sizepos.setting	= ?	Global, Modal
h.position	= ?	-50 to +50 (integer)
v.position	= ?	-50 to +50 (integer)
h.size	= ?	50 to 400 (integer)
sizepos.aspect	= ?	On, Off
v.size	= ?	50 to 400 (integer)
geometry.engine	= ?	0 = Off 1 = Keystone 2 = 4 Corner 3 = Rotation 4 = Warp
h.keystone	= ?	-40 to +40 (integer)
v.keystone	= ?	-30 to +30 (integer)
pin.barrel	= ?	-20 to +20 (integer)
continued on next page...		

Notes

☞ sizepos.enable *is identical to the* **Enable** *setting in the* **Geometry > Size & Position** *menu.*

☞ sizepos.setting *is identical to the* **Setting** *setting in the* **Geometry > Size & Position** *menu.*

☞ sizepos.aspect *is identical to the* **Aspect Lock** *setting in the* **Geometry > Size & Position** *menu.*

☞ pin.barrel *sets pincushion / barrel distortion when* geometry.engine *is set to 1 (keystone) or 3 (rotation).*

<command>	<operation>	<values>
4corner.ulx 4corner.uly 4corner.urx 4corner.ury 4corner.llx 4corner.lly 4corner.lrx 4corner.lry	= ?	-1000 to +1000
rotation	= ?	-180 to 180 (integer)
warp.map	= ?	0 to 8 (integer)
blanking.enable	= ?	on, off
blanking.top	= ?	1 to 100 (integer)
blanking.bottom	= ?	1 to 100 (integer)
blanking.left	= ?	1 to 255 (integer)
blanking.right	= ?	1 to 255 (integer)
Edge Blend menu		
array.width	= ?	1 to 4 (integer)
array.height	= ?	1 to 4 (integer)
array.hset	= ?	0 to 3 (integer)
array.vset	= ?	0 to 3 (integer)
scurve.value	= ?	10 to 25 (integer, corresponding to real values of 1.0 to 2.5)
blending	= ?	0 = Off 1 = On 2 = Alignment Pattern
segmentation	= ?	On, Off
eb.top	= ?	0 to a value of up to 720, depending on eb.bottom (integer, pixels)
eb.bottom	= ?	0 to a value of up to 720, depending on eb.top (integer, pixels)

continued on next page...

Notes

The 4corner *operations provide X and Y adjustment for each corner of the image. They are identical to the settings within the* **Geometry > Cornerstone** *menu.*

warp.map *is identical to the* **Warp Map** *setting in the* **Geometry** *menu. Set to 0 to switch this off.*

The array.width *and* array.height *operations set the width and height of the segmented array respectively.*

array.hset *and* array.vset *set the horizontal and vertical position of the projector within the segmented array.*

scurve.value *affects the shape of the S-curve which is applied to gradually reduce the brightness in the overlapped regions.*

eb.top *and* eb.bottom *are identical to the* ***Top Blend Region*** *and* ***Bottom Blend Region*** *settings from the* ***Edge Blend > Blend Width*** *menu.*

The maximum value for one region will equal 720 minus the pixels already applied to the other region.

<command>	<operation>	<values>
eb.left	= ?	0 to a value of up to 1280, depending on eb.right (integer, pixels)
eb.right	= ?	0 to a value of up to 1280, depending on eb.left (integer, pixels)
eb.blu.unblended	= ?	0 to 63 (integer)
eb.blu.topl	= ?	0 to 63 (integer)
eb.blu.top	= ?	0 to 63 (integer)
eb.blu.topr	= ?	0 to 63 (integer)
eb.blu.bottoml	= ?	0 to 63 (integer)
eb.blu.bottom	= ?	0 to 63 (integer)
eb.blu.bottomr	= ?	0 to 63 (integer)
eb.blu.midl	= ?	0 to 63 (integer)
eb.blu.midr	= ?	0 to 63 (integer)
eb.blu.x1	= ?	0 to 100 (integer)
eb.blu.y1	= ?	0 to 100 (integer)
eb.blu.x2	= ?	-100 to 0 (integer)
eb.blu.y2	= ?	-100 to 0 (integer)
eb.blu.x3	= ?	0 to 100 (integer)
eb.blu.y3	= ?	0 to 100 (integer)
eb.blu.x4	= ?	-100 to 0 (integer)
eb.blu.y4	= ?	-100 to 0 (integer)
eb.reset	=	1 = reset width 2 = reset offset 3 = reset width and offset 4 = reset black level uplift 5 = reset width and black level uplift 6 = reset offset and black level offset 7 = reset all

continued on next page...

Notes

eb.left *and* eb.right *are identical to* ***Left Blend Region*** *and* ***Right Blend Region*** *from the* ***Edge Blend > Blend Width*** *menu.*

The maximum value for one region will equal 1280 minus the pixels already applied to the other region.

eb.blu.unblended *is identical to the* ***Unblended Region*** *setting in the* ***Edge Blend > Black Level Uplift*** *menu.*

eb.blu.topl, eb.blu.top *and* eb.blu.topr *are identical to the* ***Upper Left, Upper Middle*** *and* ***Upper Right*** *settings in the* ***Edge Blend > Black Level Uplift*** *menu.*

eb.blu.bottoml, eb.blu.bottom *and* eb.blu.bottomr *are identical to the* ***Lower Left, Lower Middle*** *and* ***Lower Right*** *settings in the* ***Edge Blend > Black Level Uplift*** *menu.*

eb.blu.midl *and* eb.blu.midr *are identical to the* ***Middle Left*** *and* ***Middle Right*** *settings in the* ***Edge Blend > Black Level Uplift*** *menu.*

The eb.blu *x and y operations are identical to the X and Y settings from the* ***Edge Blend > Reduce Black Level Uplift Width*** *menu. 1 is top left, 2 is top right, 3 is bottom left, 4 is bottom right.*

<command>	<operation>	<values>
PIP menu		
pip.mode	= ?	0 = Off 1 = PIP 2 = PAP 3 = POP
pip.input	= ?	0 = CVBS 1 1 = CVBS 2 2 = S-Video 3 = Component 4 = VGA 5 = 3G-SDI 6 = DVI 7 = HDMI
pip.size	= ?	0 = small 1 = medium 2 = large
pip.position	= ?	0 = Top Left 1 = Top Right 2 = Bottom Left 3 = Bottom Right 4 = Custom
pip.hpos	= ?	0 to 100 (integer)
pip.vpos	= ?	0 to 100 (integer)
continued on next page...		

Notes

<command>	<operation>	<values>
3D menu		
3d.enable	= ?	On, Off
3d.frmultiplier	= ?	1 = x1 2 = x2 3 = x3
3d.format	= ?	auto, seq, fpack, tab, sbs
3d.darktime	= ?	0 = 0 us 1 = 650 us 2 = 1300 us 3 = 7500 us
3d.syncoffset	= ?	-15 to +15 (integer)
3d.syncpolarity	= ?	pos, neg
3d.dominance	= ?	left, right
Lamp menu		
lamp.power	= ?	1 to 100 (integer)
lamp1.hours	?	
lamp1.strikes	?	

continued on next page...

Notes

3d *commands are applicable to 3D models only.*

The values -15 to +15 represent -1500 us to +1500 us.

The lamp.power *operation has an active value range between 60 and 100. Any value lower than 60 will be interpreted as 60 by the projector.*

The lamp1.hours *operation returns the lamp hours in HH:MM format.*

<command>	<operation>	<values>
Setup menu		
orientation	= ?	0 = Desktop Front 1 = Ceiling Front 2 = Desktop Rear 3 = Ceiling Rear
latency	= ?	0 = Low Latency 1 = Best Video
dvi.boosteq	= ?	on, off
digital.colspace	= ?	0 = RGB 1 = YPbPr 2 = Auto
digital.range	= ?	0 = full 1 = limited 2 = auto
dvi.port	= ?	0 = digital 1 = analog
component.colspace	= ?	0 = RGB 1 = YPbPr
component.synctype	= ?	0 = 3 wire 1 = 4 wire 2 = Auto
3gsdi.stream	= ?	0 = Stream 1 1 = Stream 2
configuration	= ?	0 = PIP 1 = Edge Blend
shutter	= ?	on or open off or close
ir.address	= ?	0 to 255
power	= ?	on, off
continued on next page...		

Notes

<command>	<operation>	<values>
Information menu		
sw.version	?	
board.id	?	
fw.version	?	
from.version	?	
lens.version	?	
board.id3d	?	
fw.version3d	?	
seq.version	?	
continued on next page...		

Notes

- `sw.version` *returns the software release version - identical to the* **Interface** *field in the* **Information > Configuration** *menu.*
- `board.id` *is identical to the* **Hardware** *field in the* **Information > Configuration** *menu.*
- `fw.version` *returns the firmware version.*
- `from.version` *returns the factory ROM version.*
- `lens.version` *returns the lens mount version - identical to the* **Lens** *field in the* **Information > Configuration** *menu.*
- `board.id3d` *and* `fw.version3d` *work with 3D projectors only.*
- `board.id3d` *is identical to the* **3D Hardware** *field in the* **Information > Configuration** *menu.*
- `fw.version3d` *is identical to the* **Firmware 3D** *field in the* **Information > Configuration** *menu.*
- `seq.version` *returns the formatter sequences version - identical to the* **Sequences** *field in the* **Information > Configuration** *menu.*

<command>	<operation>	<values>
Miscellaneous commands		
model.name	?	
serial	?	
lamp1.serial	?	
lamp1.status	?	0 = Off 1 = Pre cooling 2 = Ignition 3 = Ignition confirm 4 = Enable communication 5 = Delay cooling 6 = Warm up eco mode 7 = Warm up 8 = Cool down no restrike 9 = Cool down ok restrike 10 = Normal 11 = Error 12 = Ignition retry 13 = Re strike delay 14 = Enable CSI 15 = Deferred shutdown 16 = Shutdown confirm 17 = Error shutdown 18 = Lamp warmup stage 1 19 = Lamp warmup stage 2
red.dmd	= ?	on, off
green.dmd	= ?	on, off
blue.dmd	= ?	on, off
mcgd.data	= ?	green-x, green-y, red-x ,red-y, blue-x, blue-y, white-x, white-y
tcgd1.data tcgd2.data	= ?	green-x, green-y, red-x ,red-y, blue-x, blue-y, white-x, white-y

continued on next page...

Notes

☞ red.dmd *enables and disables the red DMD™. Likewise, the* green.dmd *and* blue.dmd *operations control the other two DMDs.*

☞ mcgd.data, tcgd1.data *and* tcgd2.data *allow for MCGD data or user TCGD data to be sent as comma separated x and y co-ordinates in the specified order. Must be preceded by leading 0, e.g. 0.663,0.332.*

<command>	<operation>	<values>
formatter.pattern	= ?	0 = white 1 = black 2 = green 3 = red 4 = blue 5 = magenta 6 = cyan 7 = yellow 8 = checker 9 = align 10 = h-ramp 11 = v-ramp 12 = max lumens 13 = native white 14 = native black 15 = native green 16 = native red 17 = native blue 18 = native magenta 19 = native cyan 20 = native yellow 21 = off
identify	(execute)	
freeze	= ?	on, off
inlet.temp	?	
dmd.temp	?	

Notes

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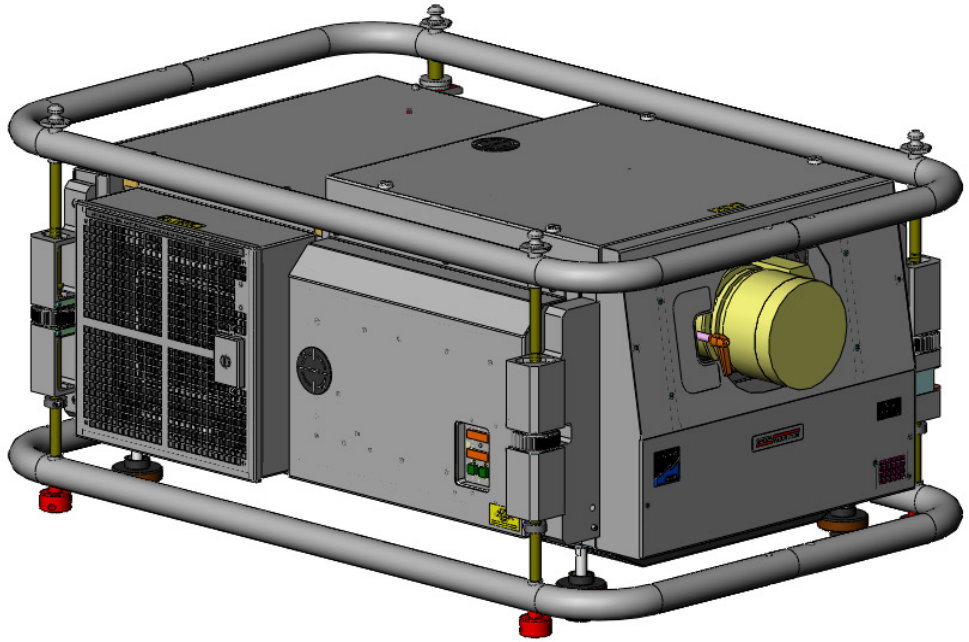

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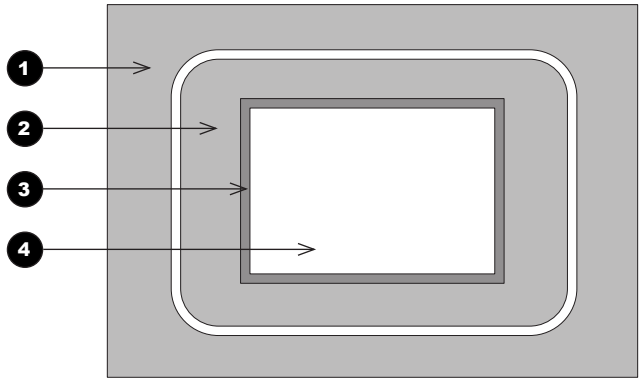
The DMD™

A DMD™ (Digital Micromirror Device™) is a true digital light modulator which utilises an array of up to 2.3 million moving aluminium mirrors, with each one representing a pixel in the final projected image. The outermost micromirrors in the array remain inactive and are not used in constructing the image.

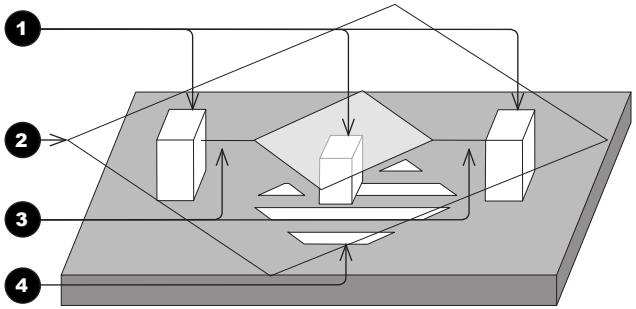
1. **Casing**
2. **Light shield**
3. **Inactive mirrors**
4. **Array**



DMD

Each mirror element is suspended over address electrodes by a torsion hinge between two posts.

1. **Support posts**
2. **Mirror element**
3. **Torsion hinges**
4. **Offset address electrode**



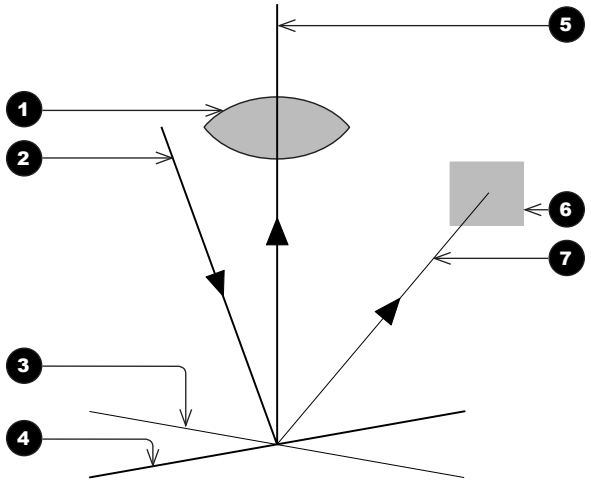
Mirror element with tilt mechanism

Notes

The DMD™ (continued)

Depending on the voltage polarity applied, each mirror will either tilt to the left to produce a bright pixel or to the right for a dark pixel. When light is applied to the complete DMD™, only the light redirected from a mirror tilting to the left is projected.

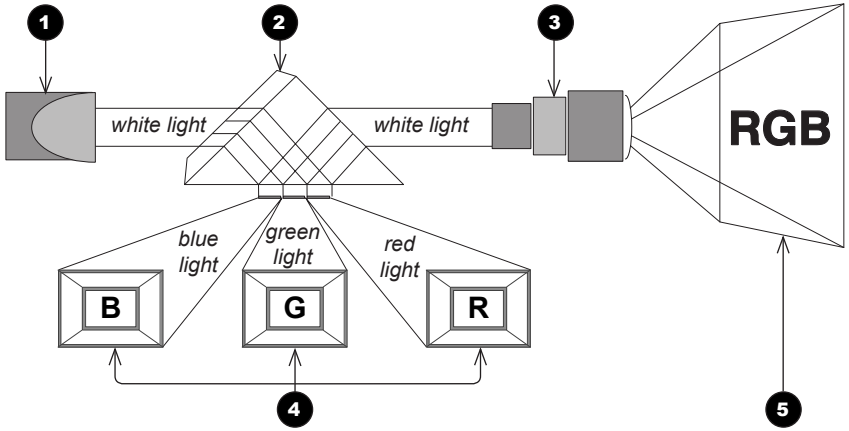
1. **Projection lens**
2. **Incoming light from the lamp**
3. **Mirror element tilted to the right**
4. **Mirror element tilted to the left**
5. **Reflected light, left tilt**
6. **Light dump**
7. **Reflected light, right tilt**



Light flow

The projector optically filters white light from the lamp into its constituent red, green and blue. Each color illuminates a separate DMD™ whose modulated output is then recombined with the other two to form the projected full color image.

1. **Lamp**
2. **Optical filtering of light into red, green and blue**
3. **Projection lens**
4. **DMD™ devices**
5. **Full color image displayed on screen**



Filtering process

Notes

Aspect Ratios Explained

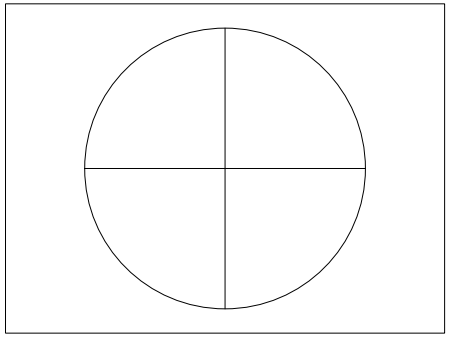
The appearance of a projected image on the screen depends on a combination of the following:

- The DMD™ resolution:
  - **SX+ (SXGA+)** with a 1400 x 1050 resolution, corresponding to an aspect ratio of 4:3
  - **1080p** with a 1920 x 1080 resolution, corresponding to an aspect ratio of 16:9
  - **WUXGA** with a 1920 x 1200 resolution, corresponding to an aspect ratio of 16:10
- The aspect ratio of the input signal: **4:3**, **16:9** or **16:10**
- The value of the **Aspect Ratio** setting of the projector:
  - **Source** - show the image with its original aspect ratio, not using the whole screen if the DMD™ aspect ratio does not match.
  - **Fill Display** - fill the screen but force the DMD™ aspect ratio on the image.
  - **Fill & Crop** - fill the screen without changing the original aspect ratio but cropping the image to fit the DMD™ aspect ratio.
  - **Anamorphic** - force a 16:9 ratio on the source. You need this setting to resolve 16:9 images packed into a 4:3 frame, otherwise it distorts the image.
  - **TheaterScope** is a special setting used in combination with an anamorphic lens, an optional accessory. It removes letterboxing from a 2.35:1 source packed into a 16:9 frame.

Notes

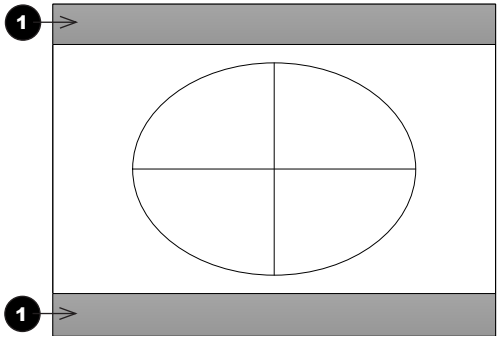
Aspect ratio examples for DMD™ resolution SX+ (SXGA+)

Source: 4:3 (native resolution)



Aspect Ratio:
Source / Fill Display / Fill & Crop

1 **Unused screen areas**



Aspect Ratio: Anamorphic

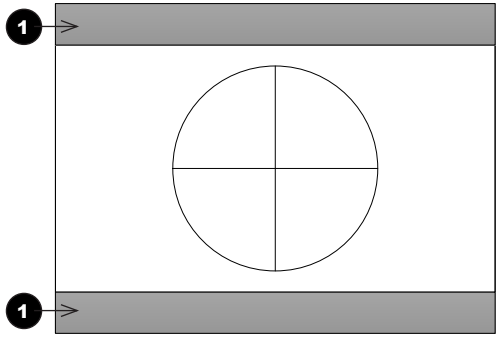
Notes

Aspect ratio examples for DMD™ resolution SX+ (SXGA+) (continued)

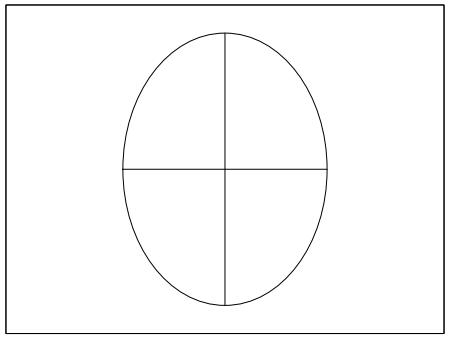
Source: 16:9

1 Unused screen areas

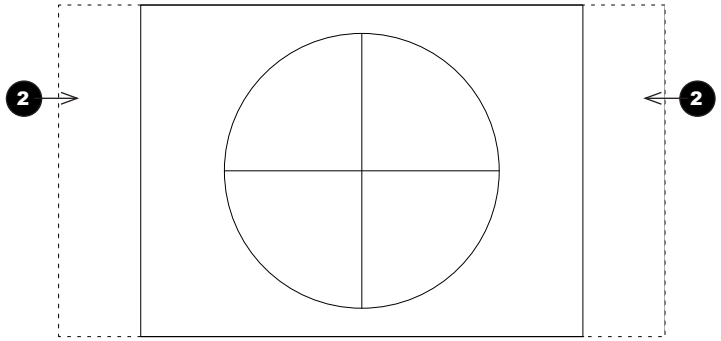
2 Cropped parts of the image



Aspect Ratio: Source



Aspect Ratio: Fill Display

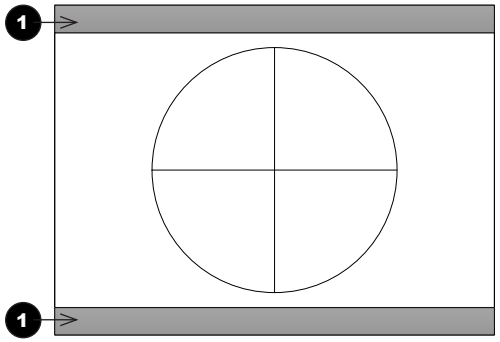


Aspect Ratio: Fill & Crop

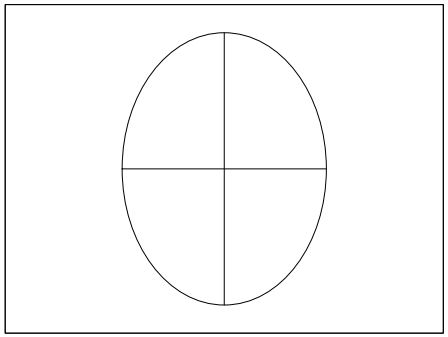
Notes

Aspect ratio examples for DMD™ resolution SX+ (SXGA+) (continued)

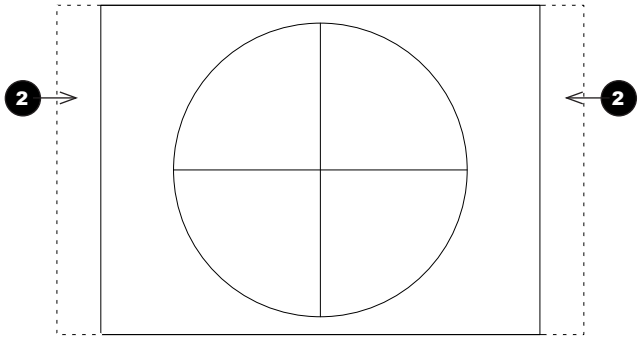
Source: 16:10



Aspect Ratio: Source



Aspect Ratio: Fill Display



Aspect Ratio: Fill & Crop

1 Unused screen areas

2 Cropped parts of the image

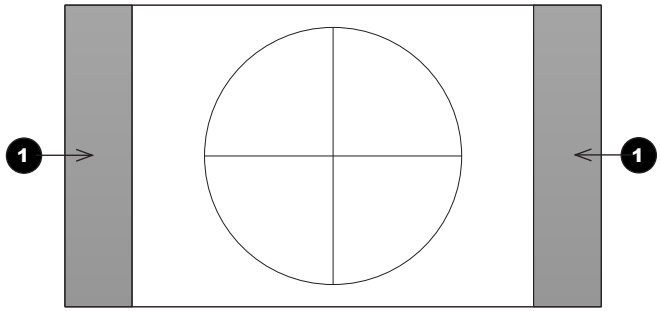
Notes

Aspect ratio examples for DMD™ resolution 1080p

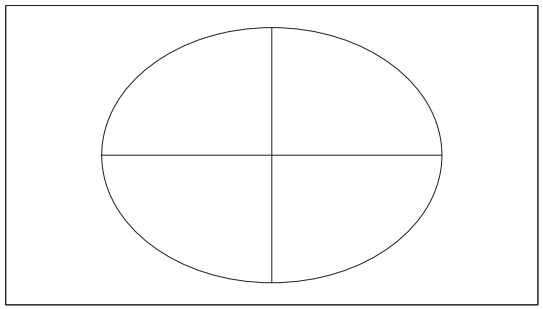
Source: 4:3

1 **Unused screen areas**

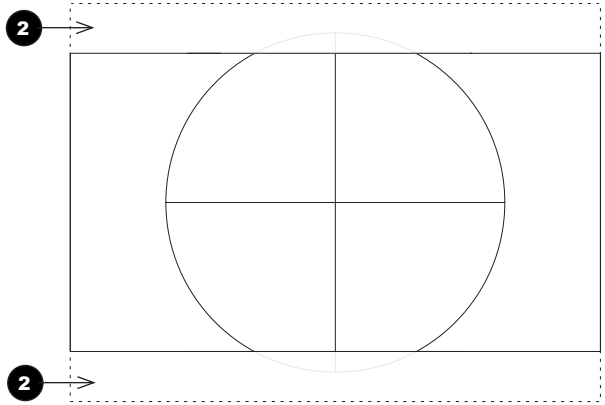
2 **Cropped parts of the image**



Aspect Ratio: Source



Aspect Ratio: Fill Display, Anamorphic

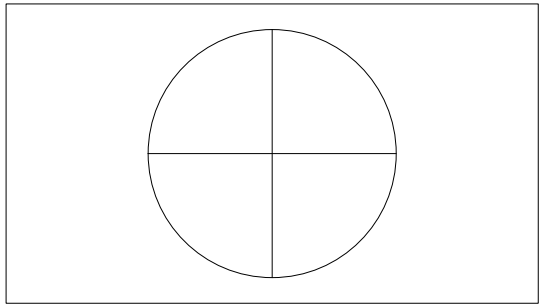


Aspect Ratio: Fill & Crop

Notes

Aspect ratio examples for DMD™ resolution 1080p (continued)

Source: 16:9 (native resolution)



Aspect Ratio: Source / Fill Display / Fill & Crop

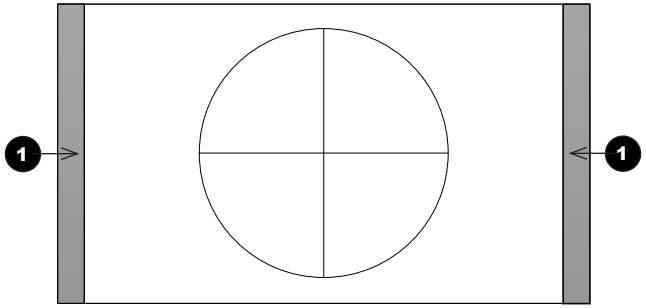
Notes

Aspect ratio examples for DMD™ resolution 1080p (continued)

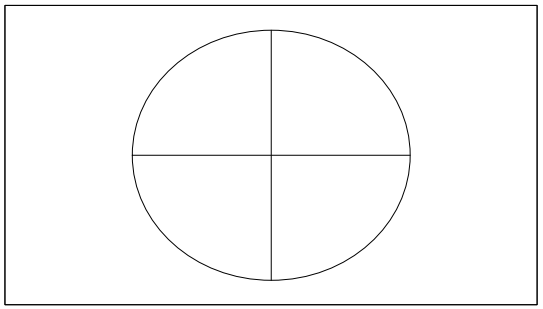
Source: 16:10

1 **Unused screen areas**

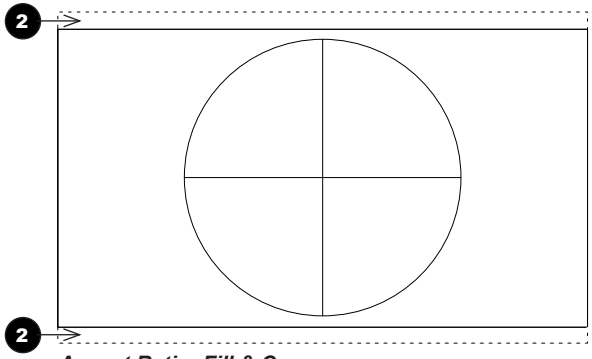
2 **Cropped parts of the image**



Aspect Ratio: Source



Aspect Ratio: Fill Display



Aspect Ratio: Fill & Crop

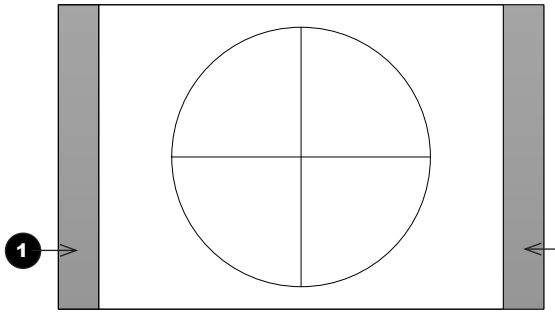
Notes

Aspect ratio examples for DMD™ resolution WUXGA

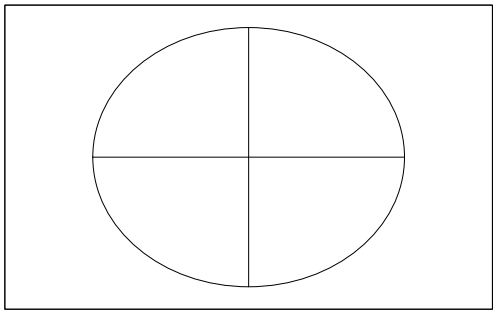
Source: 4:3

1 **Unused screen areas**

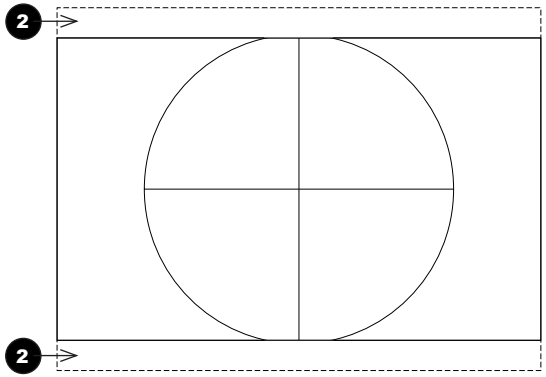
2 **Cropped parts of the image**



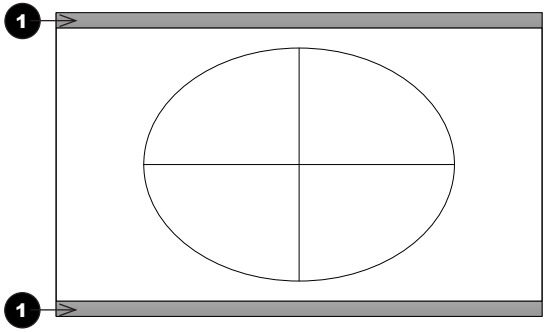
Aspect Ratio: Source



Aspect Ratio: Fill Display



Aspect Ratio: Fill & Crop



Aspect Ratio: Anamorphic

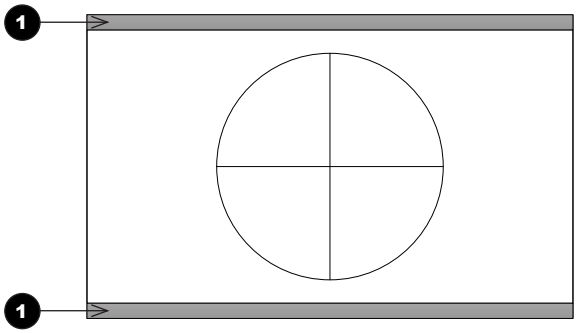
Notes

Aspect ratio examples for DMD™ resolution WUXGA (continued)

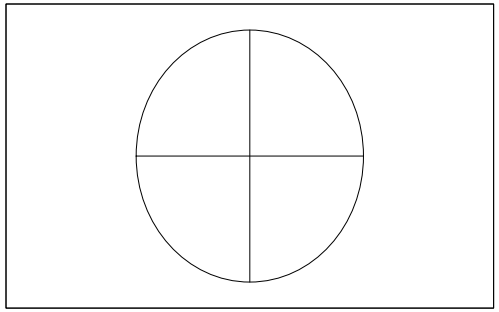
Source: 16:9

1 Unused screen areas

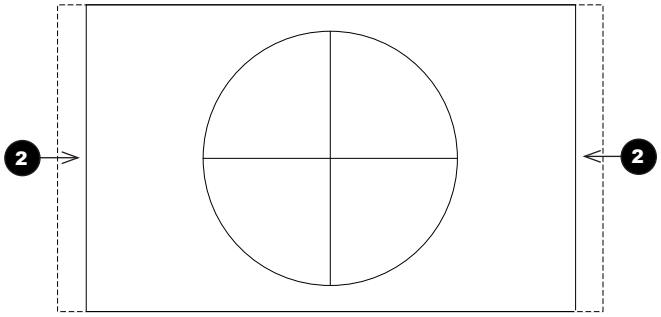
2 Cropped parts of the image



Aspect Ratio: Source



Aspect Ratio: Fill Display

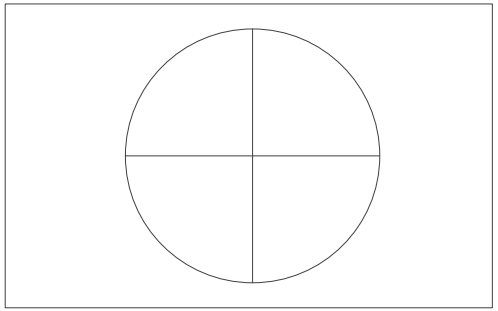


Aspect Ratio: Fill & Crop

Notes

Aspect ratio examples for DMD™ resolution WUXGA (continued)

Source: 16:10 (native resolution)



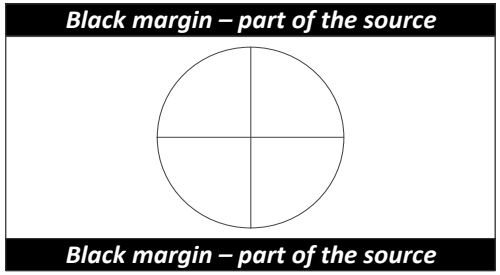
Aspect Ratio: Source / Fill Display / Fill & Crop

Notes

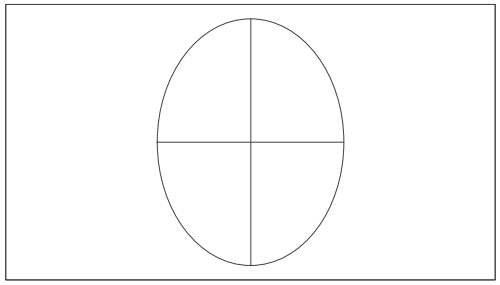
Aspect ratio example: TheaterScope

The **TheaterScope** setting is used in combination with an anamorphic lens to restore 2.35:1 images packed into a 16:9 frame. Such images are projected with black lines at the top and bottom of the 16:9 screen to make up for the difference in aspect ratios.

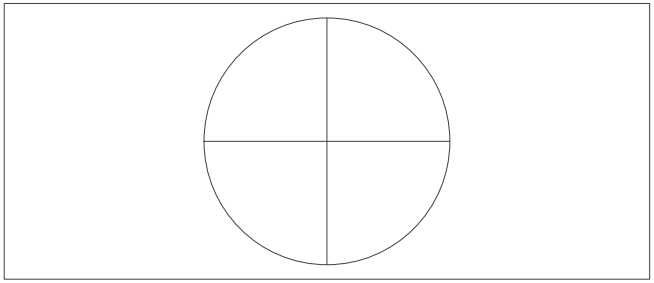
Without an anamorphic lens and without the TheaterScope setting applied, a 16:9 source containing a 2.35:1 image looks like this:



If we change the setting to **TheaterScope**, the black lines will disappear but the image will stretch vertically to reach the top and bottom of the DMD™:



An anamorphic lens will stretch the image horizontally, restoring the original 2.35 ratio:



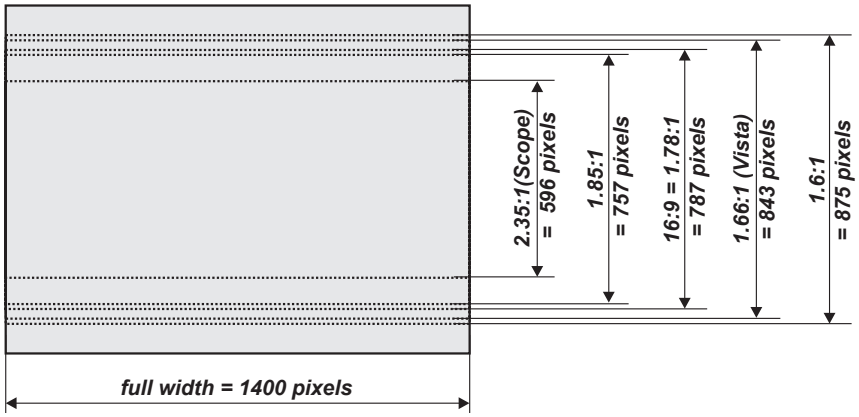
Notes

Screen Requirements

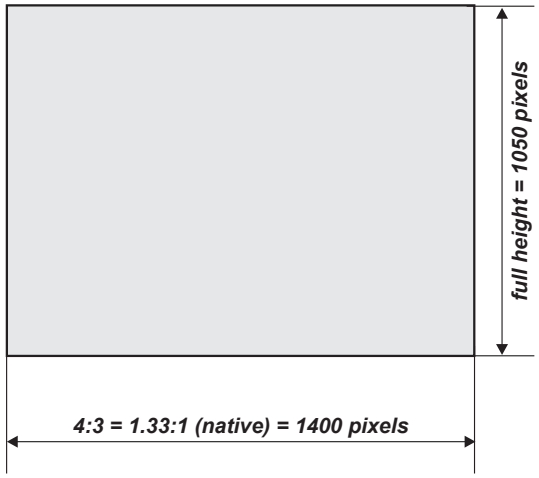
Fitting the image to the DMD™

If the source image supplied to the projector is smaller than the DMD™ resolution, the image will not fill the DMD™. The following examples show how a number of common formats may be displayed, depending on your DMD™ resolution.

SX+ images displayed full width



SX+ images displayed full height

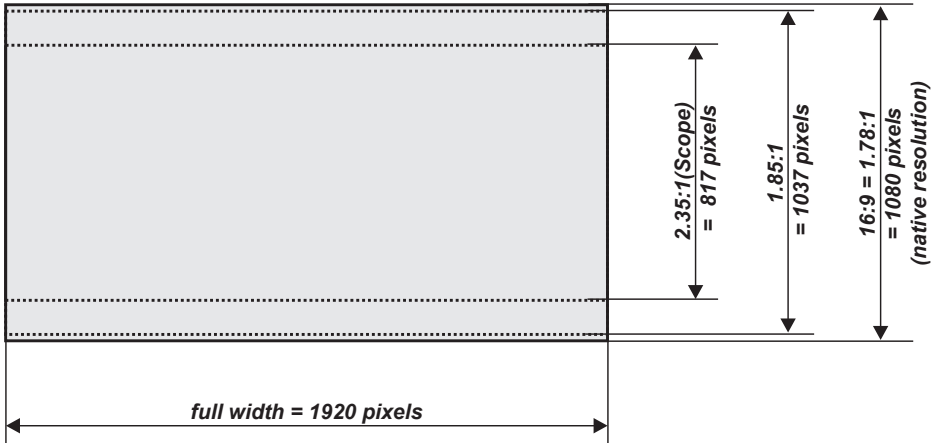


Notes

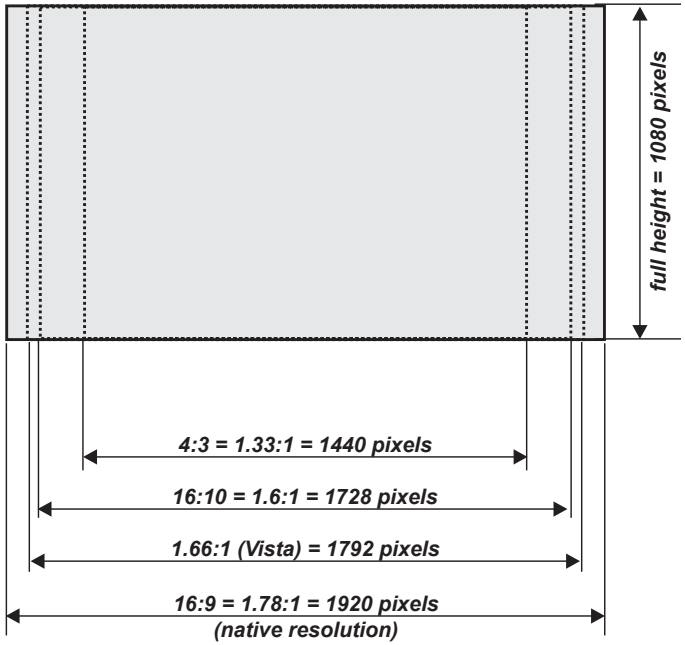
The images are shown here scaled automatically by the projector.

The image may be scaled differently if the aspect ratio is set differently in the **Geometry** *menu.*

1080p images displayed full width



1080p images displayed full height

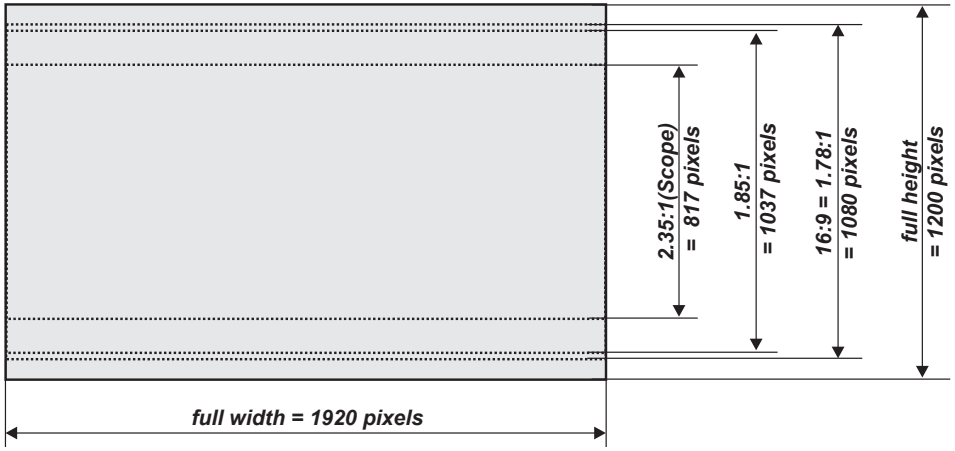

full height = 1080 pixels
4:3 = 1.33:1 = 1440 pixels
16:10 = 1.6:1 = 1728 pixels
1.66:1 (Vista) = 1792 pixels
16:9 = 1.78:1 = 1920 pixels
(native resolution)

Notes

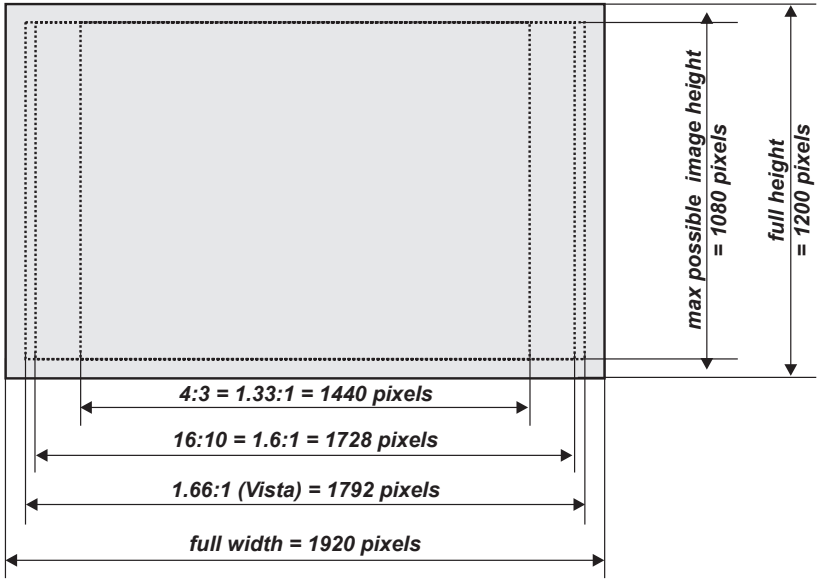
The images are shown here scaled automatically by the projector.

The image may be scaled differently if the aspect ratio is set differently in the **Geometry** *menu.*

WUXGA images displayed full width



WUXGA images displayed with a height of 1080 pixels


max possible image height
= 1080 pixels
full height
= 1200 pixels
4:3 = 1.33:1 = 1440 pixels
16:10 = 1.6:1 = 1728 pixels
1.66:1 (Vista) = 1792 pixels
full width = 1920 pixels

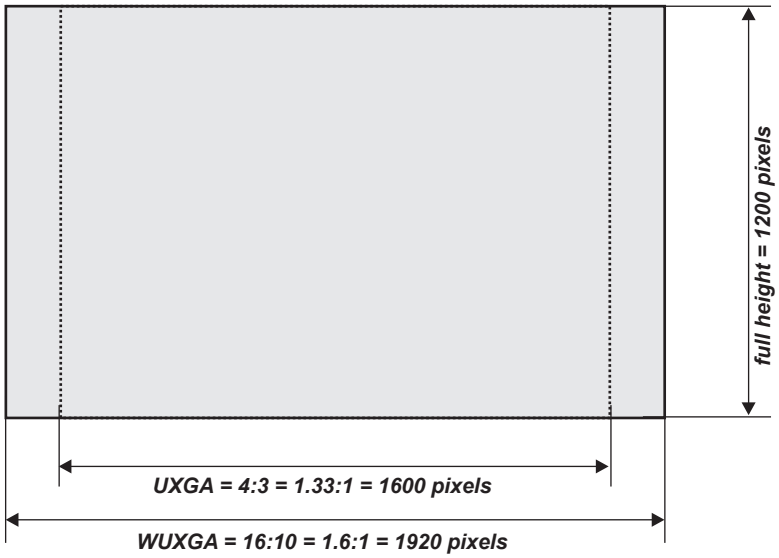
Notes

The images are shown here scaled automatically by the projector.

The image may be scaled differently if the aspect ratio is set differently in the **Geometry** *menu.*

The images shown here cannot fill the full height of the DMD™, and will be scaled to a height of 1080 pixels.

WUXGA images displayed full height



Notes

Only WUXGA or UXGA images can fill the full height of the DMD™, using all 1200 pixels.

Diagonal screen sizes

Screen sizes are sometimes specified by their diagonal size (D). When dealing with large screens and projection distances at different aspect ratios, it is more convenient to measure screen width (W) and height (H).

The example calculations below show how to convert diagonal sizes into width and height, at various aspect ratios.

2.35:1 (Scope)
W = D x 0.92 ***H*** = D x 0.39

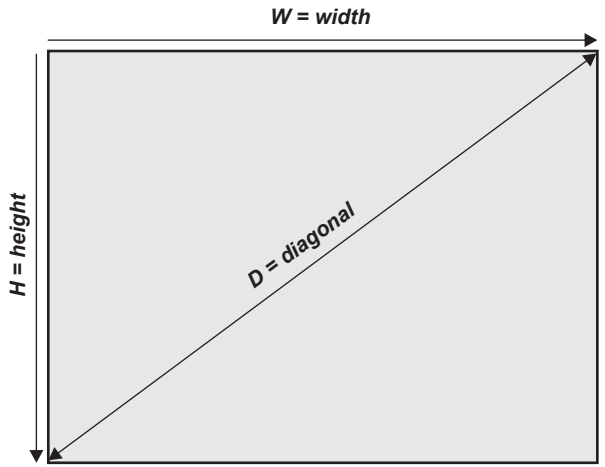
1.85:1
W = D x 0.88 ***H*** = D x 0.47

16:9 = 1.78:1 (native aspect ratio for 1080p projectors)
W = D x 0.87 ***H*** = D x 0.49

1.66:1 (Vista)
W = D x 0.86 ***H*** = D x 0.52

16:10 = 1.6:1 (native aspect ratio for WUXGA projectors)
W = D x 0.85 ***H*** = D x 0.53

4:3 = 1.33:1 (native aspect ratio for SX+ projectors)
W = D x 0.8 ***H*** = D x 0.6



Notes

Fitting the image to the screen

It is important that your screen is of sufficient height and width to display images at all the aspect ratios you are planning to use.

Use the conversion chart, or the sample calculations below to check that you are able to display the full image on your screen. If you have insufficient height or width, you will have to reduce the overall image size in order to display the full image on your screen.

1 **4:3 = 1.33:1**
(native aspect ratio for SX+ projectors)

W = H x 1.33, H = W x 0.75

2 **16:10 = 1.6:1**
(native aspect ratio for WUXGA projectors)

W = H x 1.6, H = W x 0.625

3 **1.66:1 (Vista)**

W = H x 1.66, H = W x 0.6

4 **16:9 = 1.78:1**
(native aspect ratio for 1080p projectors)

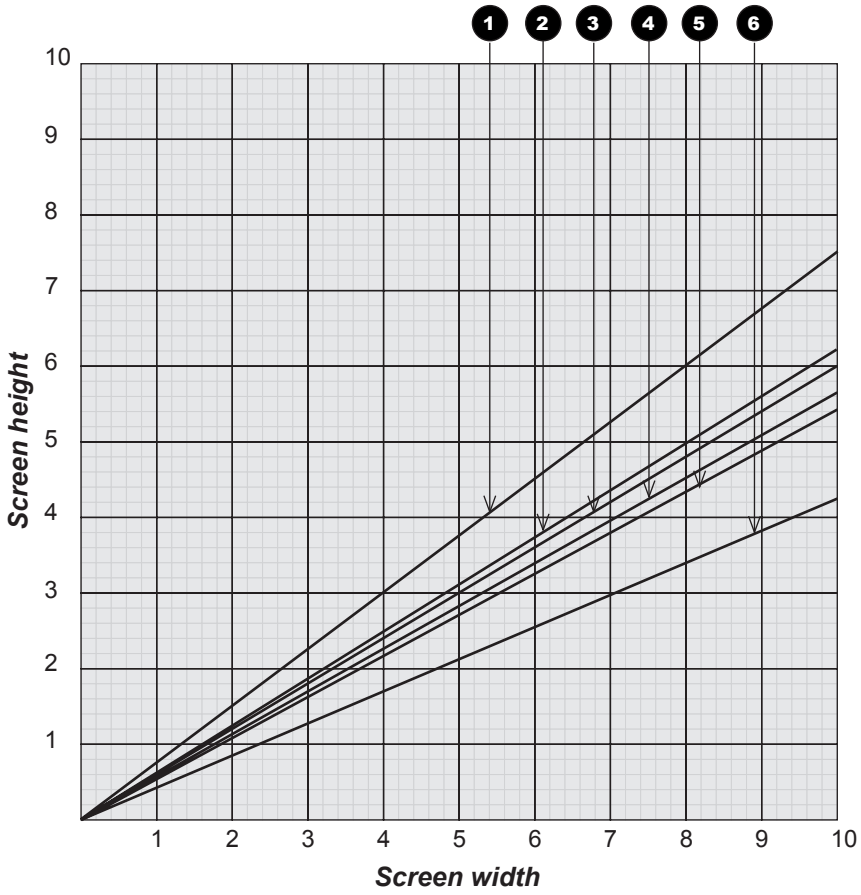
W = H x 1.78, H = W x 0.56

5 **1.85:1 (Flat)**

W = H x 1.85, H = W x 0.54

6 **2.35:1 (Scope)**

W = H x 2.35, H = W x 0.426

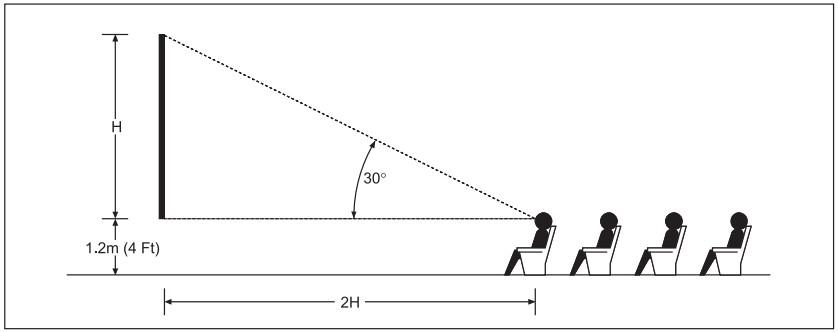


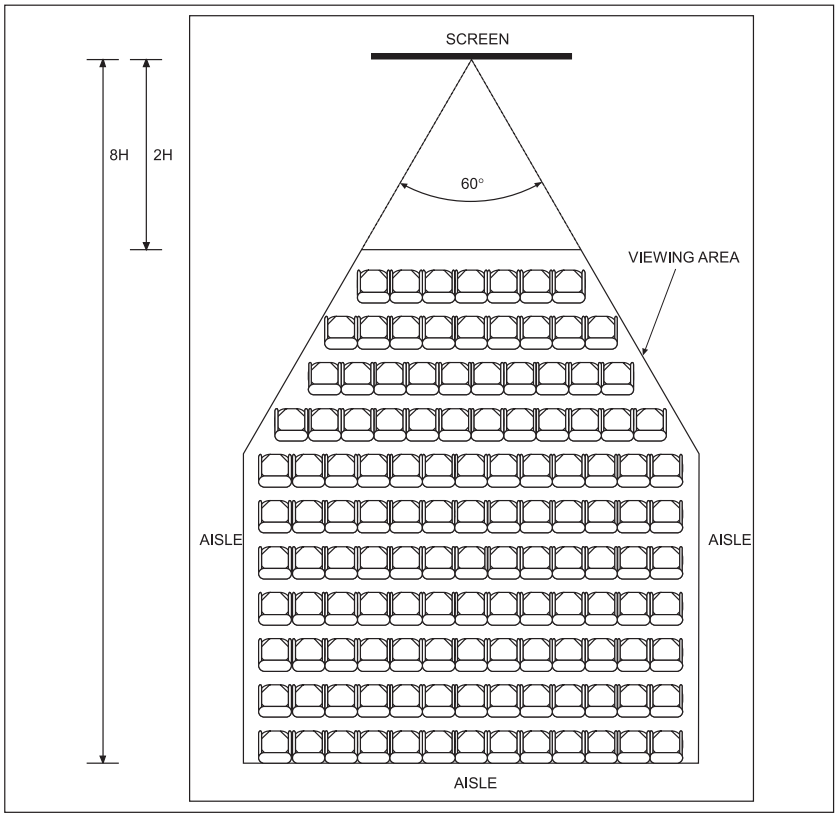
Notes

Positioning the screen and projector

For optimum viewing, the screen should be a flat surface perpendicular to the floor. The bottom of the screen should be 1.2m (4 feet) above the floor and the front row of the audience should not have to look up more than 30° to see the top of the screen.

The distance between the front row of the audience and the screen should be at least twice the screen height and the distance between the back row and the screen should be a maximum of 8 times the screen height. The screen viewing area should be within a 60° range from the face of the screen.





Notes

The projector should be installed as close to the power outlet as possible.

The power connection should be easily accessible, so that it can be disconnected in an emergency.

Ensure that there is at least 30cm (12in) of space between the ventilation outlets and any wall, and 10cm (4in) on all other sides.

Do not install the projector close to anything that might be affected by its operational heat, for instance, polystyrene ceiling tiles, curtains etc.

*The image can be flipped for rear projection (see the **Operating Guide**) and displayed without the need for extra mirrors or equipment.*

However, you must ensure that there is sufficient distance behind the screen for the projector to be correctly located.

Rear installation is generally more complicated and advice should be sought from your local dealer before attempting it.

Choosing A Lens

A number of lenses are available. Which lens you choose will depend on the screen size, image aspect ratio, projection distance and light output. In addition, each lens is available in two versions: High Brightness and High Contrast.

The lenses available are listed below:

Lens (WUXGA and 1080p)	Lens (SX+)
0.67 : 1 fixed lens	0.73 : 1 fixed lens
1.12 : 1 fixed lens (3 - 15m)	1.2 : 1 fixed lens (3 - 15m)
1.12 : 1 fixed lens (1.2 - 2m)	1.2 : 1 fixed lens (1.2 - 2m)
1.16 - 1.49 : 1 zoom lens	1.26 - 1.61 : 1 zoom lens
1.39 - 1.87 : 1 zoom lens	1.5 - 2.02 : 1 zoom lens
1.87 - 2.56 : 1 zoom lens	2.02 - 2.77 : 1 zoom lens
2.56 - 4.17 : 1 zoom lens	2.77 - 4.51 : 1 zoom lens
4.17 - 6.95 : 1 zoom lens	4.51 - 7.53 : 1 zoom lens
6.93 - 10.34 : 1 zoom lens	7.5 - 11.2 : 1 zoom lens

If the image does not fill the full width of the DMD™, this effectively increases the throw ratio of the lens. This can be corrected by applying a throw ratio factor (TRF).

To choose a lens for your projector, you can either apply a lens calculation, or use the lens charts provided here for quick reference.

Notes

The High Brightness lenses are recommended for the standard models, for maximum light output.

The High Contrast lenses are recommended for the Ultra Contrast models, for maximum contrast.

The same lens has different effective throw ratios for WUXGA and 1080p, and for SX+, due to the different width of the DMD.

Each time a new lens is fitted to the projector, the calibration procedure must be carried out. See *Lens menu* in the *Operating Guide*.

*For more information about throw ratio factor (TRF), see **Choosing a lens by calculation** later in this section.*

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

Choosing a lens by calculation

For any screen size not listed above, or if you need to be more precise, you can use the calculations below.

1. Identify the width of the image in pixels.
2. Calculate the throw ratio factor (TRF):

$$TRF = \frac{DMD\ width}{Image\ width\ in\ pixels}$$

3. Identify the screen width required.
4. Identify the throw distance required.
5. Calculate the throw ratio required.

$$Throw\ ratio = \frac{Throw\ distance}{Screen\ width \times TRF}$$

6. Choose a lens with the required throw ratio from the list below.
   Check from the list that the lens chosen will work at the throw distance required.

Throw ratios for 1080p and WUXGA	Throw ratios for SX+	Lens extension (±2%)	Throw distance range
0.67 : 1 fixed lens	0.73 : 1 fixed lens	204 mm (8.0 in)	1.1 - 3.2m (3.6 - 10.5ft)
1.12 : 1 fixed lens (3 - 15m)	1.21 : 1 (3 - 15m) fixed lens	268 mm (10.6 in)	3 - 15m (9.8 - 49.2ft)
1.12 : 1 fixed lens (1.2 - 2m)	1.21 : 1 (1.2 - 2.0m) fixed lens	268 mm (10.6 in)	1.2 - 2m (3.9 - 6.6ft)
1.16 - 1.49 : 1 zoom lens	1.26 - 1.61 : 1 zoom lens	226 mm (8.9 in)	3 - 15m (9.8 - 49.2ft)
1.39 - 1.87 : 1 zoom lens	1.5 - 2.02 : 1 zoom lens	194 mm (7.6 in)	4 - 24m (13.1 - 78.7ft)
1.87 - 2.56 : 1 zoom lens	2.02 - 2.77 : 1 zoom lens	159 mm (6.3 in)	4 - 24m (13.1 - 78.7ft)
2.56 - 4.17 : 1 zoom lens	2.77 - 4.51 : 1 zoom lens	145 mm (5.7 in)	9.1 - 45m (29.9 - 147.6ft)
4.17 - 6.95 : 1 zoom lens	4.51 - 7.53 : 1 zoom lens	129 mm (5.1 in)	12 - 80m (39.4 - 262.5ft)
6.93 - 10.34 : 1 zoom lens	7.5 - 11.2 : 1 zoom lens	179 mm (7.0 in)	12 - 80m (39.4 - 262.5ft)

Notes

The throw ratio for a particular lens is fixed, but assumes that the image fills the width of the DMD.

For images that do not fill the width of the DMD, the throw ratio is effectively increased. To correct for this in these calculations, a throw ratio factor (TRF) is used.

The DMD width is 1920 for WUXGA and 1080p projectors, and 1400 for SX+ projectors.

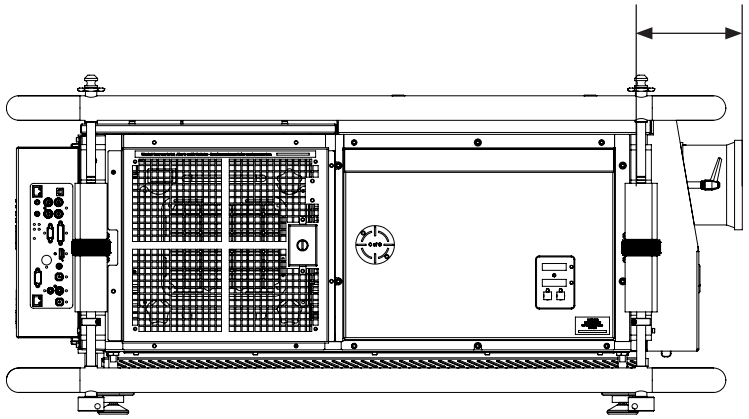
Throw distance calculations are based on the distance from the outer end of the lens, which will vary from lens to lens. Once a lens has been chosen, the figures can be checked using the lens extension values given in the table on this page.

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

Throw distance and lens extension

The throw distance is calculated to the outer end of the lens. The nominal distance between the front of the projector and the outer end of the lens is called **lens extension**.

Lens extension values will vary from lens to lens. Once a lens has been chosen, the figures can be checked using the values given on the previous page.



Lens extension measured from front of corner post

Notes

The throw ratio for a particular lens is fixed, but assumes that the image fills the width of the DMD.

For images that do not fill the width of the DMD, the throw ratio is effectively increased. To correct for this in these calculations, a throw ratio factor (TRF) is used.

*For information about lens extensions and individual lens part numbers, see **Appendix A** at the end of this document.*

Lens extension is measured when the lens is focused at infinity, and fully extended. At other focus settings, the extension could be up to 10mm less.

Useful lens calculations

$$\text{Throw ratio} = \frac{\text{Throw distance}}{\text{Screen width} \times \text{TRF}} \qquad \text{TRF} = \frac{\text{DMD width}}{\text{Image width in pixels}}$$

$$\text{Screen width} = \frac{\text{Throw distance}}{\text{Throw ratio} \times \text{TRF}} \qquad \text{Throw distance} = \text{Screen width} \times \text{Throw ratio} \times \text{TRF}$$

Examples of lens calculations

Use the information in **Appendix A** at the end of this **Reference Guide** to identify the exact lens needed.

for WUXGA and 1080p

Image size 1024 x 768 pixels, screen width 6.5m, throw distance 18m from the outer end of the lens.

- *Throw ratio factor (TRF) = 1920 / 1024 = 1.875*
- *Throw ratio required = 18 / (6.5 x 1.875) = 1.48*

Choose ***the 1.39 - 1.87 : 1 zoom lens***.

for SX+

Image size 1024 x 768 pixels, screen width 6.5m, throw distance 18m from the outer end of the lens.

- *Throw ratio factor (TRF) = 1400 / 1024 = 1.37*
- *Throw ratio required = 18 / (6.5 x 1.37) = 2.02*

Choose ***the 2.0 - 2.77 zoom lens***.

Notes

The throw ratio for a particular lens is fixed, but assumes that the image fills the width of the DMD.

For images that do not fill the width of the DMD, the throw ratio is effectively increased. To correct for this in these calculations, a throw ratio factor (TRF) is used.

The DMD width is 1920 for WUXGA and 1080p projectors, and 1400 for SX+ projectors.

*Throw distance calculations are based on the distance from the outer end of the lens, which will vary from lens to lens. Once a lens has been chosen, the figures can be checked using the lens extension values given in **Appendix A** at the end of this document.*

Lens charts

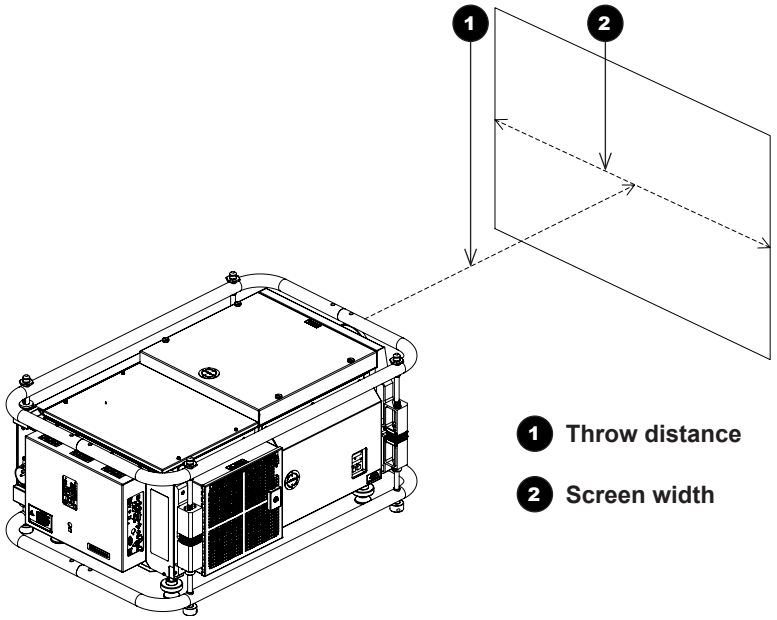
How to use the lens charts

The lens charts on the following pages provide a quick guide to the type of lens needed for a particular projector.

To use the lens charts, you need the following information:

- The DMD resolution of your projector
- The distance between the projector and the screen (throw distance)
- The maximum width of your screen

In the chart for the required DMD resolution, find the point where the throw distance corresponds to the screen width, as shown in the example below.

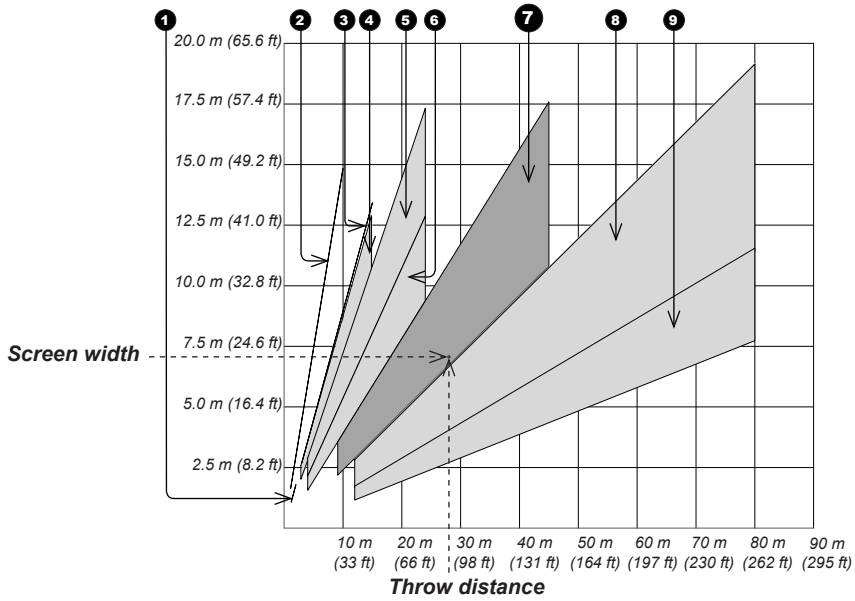


Example

For a 1080p projector with

- throw distance 28 m, and
- screen width 7 m,

the correct lens would be number 7 in the chart.



Notes

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

1080p (1920 x 1080 pixels)

Full width images

Formats that fit the width of the DMD™ without applying a throw ratio factor (TRF) include:

- **2.35:1 (Scope)** 1920 x 817 pixels TRF = 1
- **1.85:1 (Flat)** 1920 x 1037 pixels TRF = 1
- **1.78:1 (16:9)** 1920 x 1080 pixels (native resolution) TRF = 1

Full height images

A throw ratio factor (TRF) has been applied to the following charts:

- **1.25:1 (5:4)** 1350 x 1080 pixels TRF = 1.42
- **1.33:1 (4:3)** 1440 x 1080 pixels TRF = 1.33
- **1.6:1 (16:10)** 1728 x 1080 pixels TRF = 1.11
- **1.66:1 (Vista)** 1792 x 1080 pixels TRF = 1.07

Notes

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

WUXGA (1920 x 1200 pixels)

Full width images

Formats that fit the width of the DMD™ without applying a throw ratio factor (TRF) include:

- **2.35:1 (Scope)** 1920 x 817 pixels TRF = 1
- **1.85:1 (Flat)** 1920 x 1037 pixels TRF = 1
- **1.78:1 (16:9)** 1920 x 1080 pixels TRF = 1
- **1.66:1 (Vista)** 1920 x 1156 pixels TRF = 1
- **1.6:1 (16:10)** 1920 x 1200 pixels (native resolution) TRF = 1

Full height images

A throw ratio factor (TRF) has been applied to the following charts:

- **1.25:1 (5:4)** 1500 x 1200 pixels TRF = 1.28
- **1.33:1 (4:3)** 1600 x 1200 pixels TRF = 1.2

Notes

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

SX+ (1400 x 1050 pixels)

Full width images

Formats that fit the width of the DMD™ without applying a throw ratio factor (TRF) include:

- **2.35:1 (Scope)** 1400 x 596 pixels TRF = 1
- **1.85:1 (Flat)** 1400 x 757 pixels TRF = 1
- **1.78:1 (16:9)** 1400 x 786 pixels TRF = 1
- **1.66:1 (Vista)** 1400 x 843 pixels TRF = 1
- **1.6:1 (16:10)** 1400 x 875 pixels TRF = 1
- **1.33:1 (4:3)** 1400 x 1050 pixels (native resolution) TRF = 1

Full height images

A throw ratio factor (TRF) has been applied to the following chart:

1.25:1 (5:4) 1312 x 1050 pixels TRF = 1.07

Notes

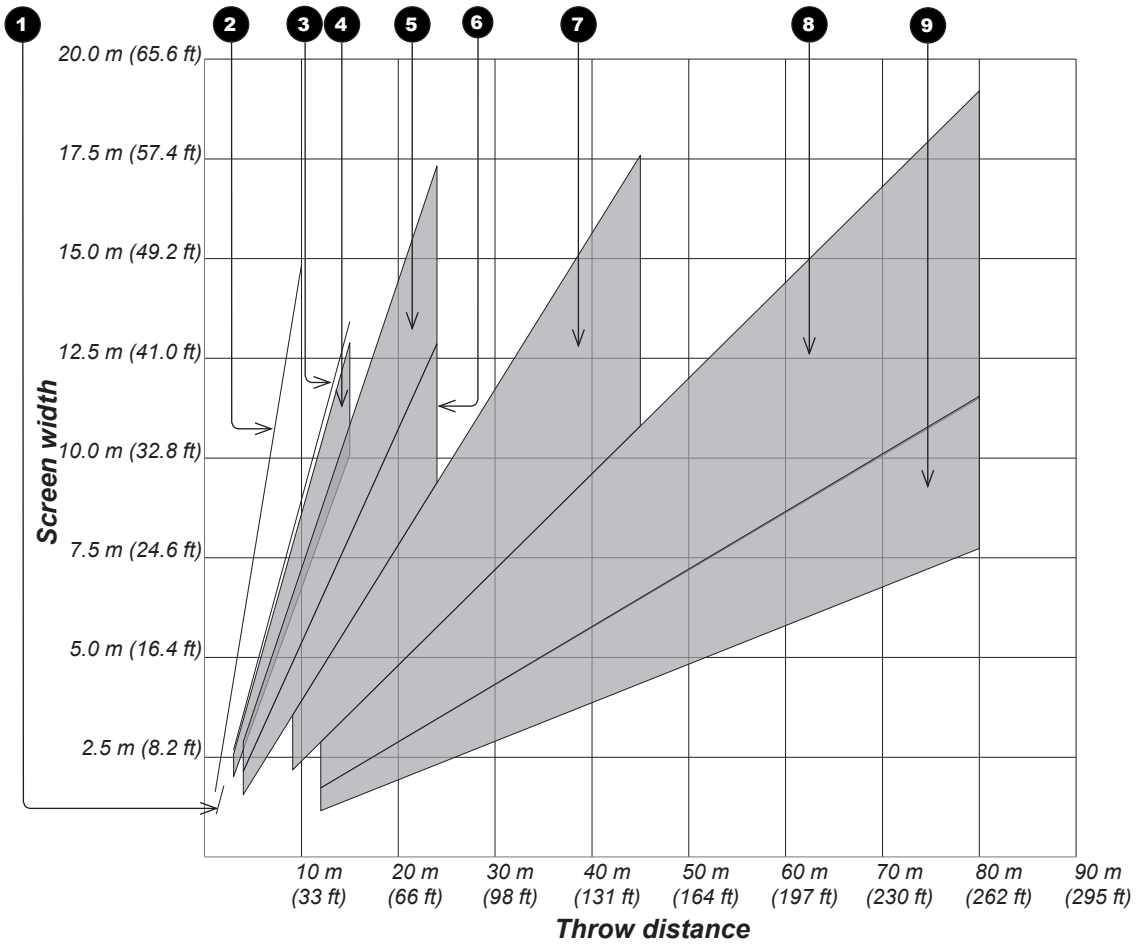
*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

DMD™ resolution 1080p / WUXGA, full width images

For 1080p, full width images are 2.35:1 (Scope), 1.85:1 (Flat) 1.78:1 (native).

For WUXGA, full width images are all of the above, plus 1.66:1 (Vista) and 1.6:1 (native).

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **2.56 - 4.17 : 1 zoom lens**
8. **4.17 - 6.95 : 1 zoom lens**
9. **6.93 - 10.34 : 1 zoom lens**



Notes

This chart has a TRF of 1.0, for use with the following images:

For WUXGA:

2.35:1 (Scope), 1.85:1 (Flat), 1.78:1 (16:9), 1.66:1 (Vista) and 1.6:1 (native)

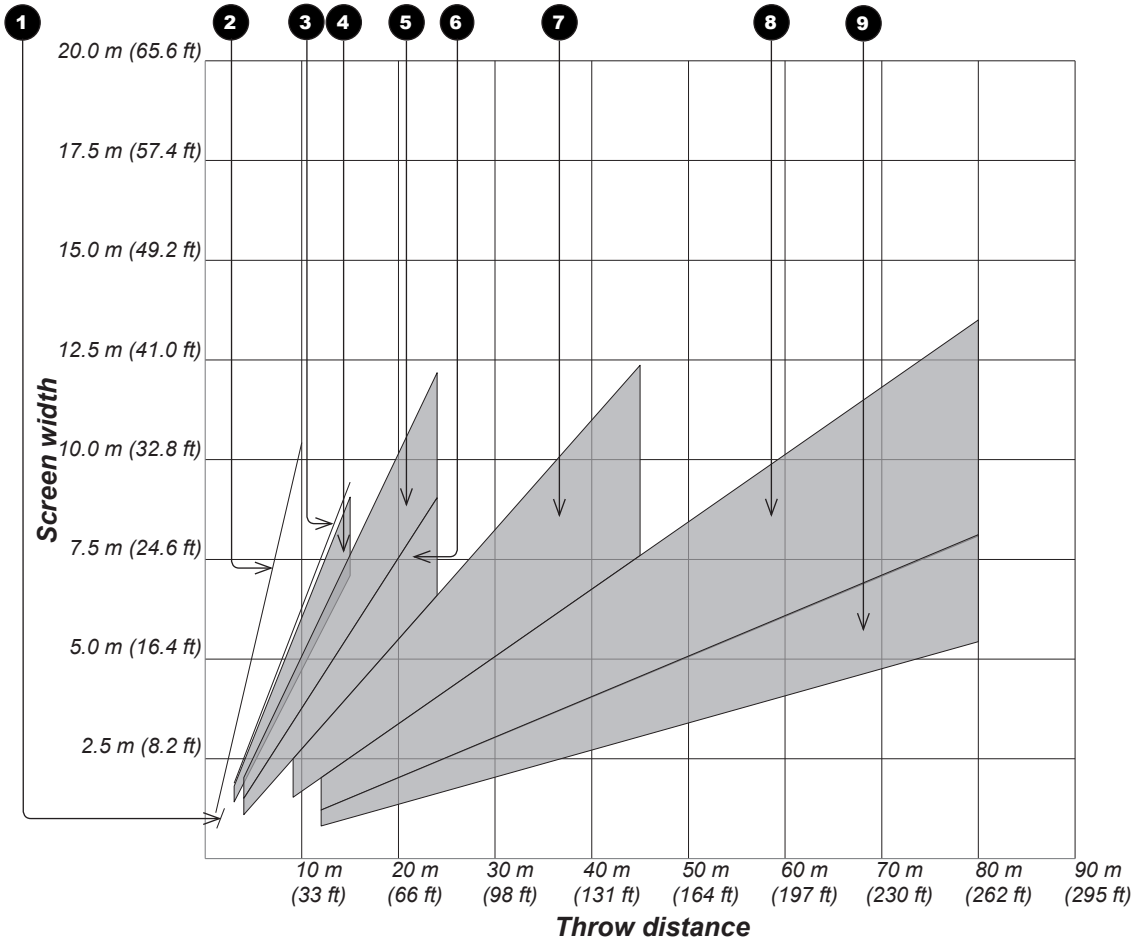
For 1080p:

2.35:1 (Scope), 1.85:1 (Flat) and 1.78:1 (native)

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

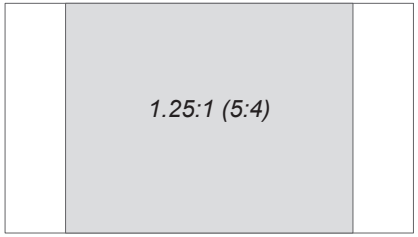
DMD™ resolution 1080p, 1.25:1 images

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **2.56 - 4.17 : 1 zoom lens**
8. **4.17 - 6.95 : 1 zoom lens**
9. **6.93 - 10.34 : 1 zoom lens**



Notes

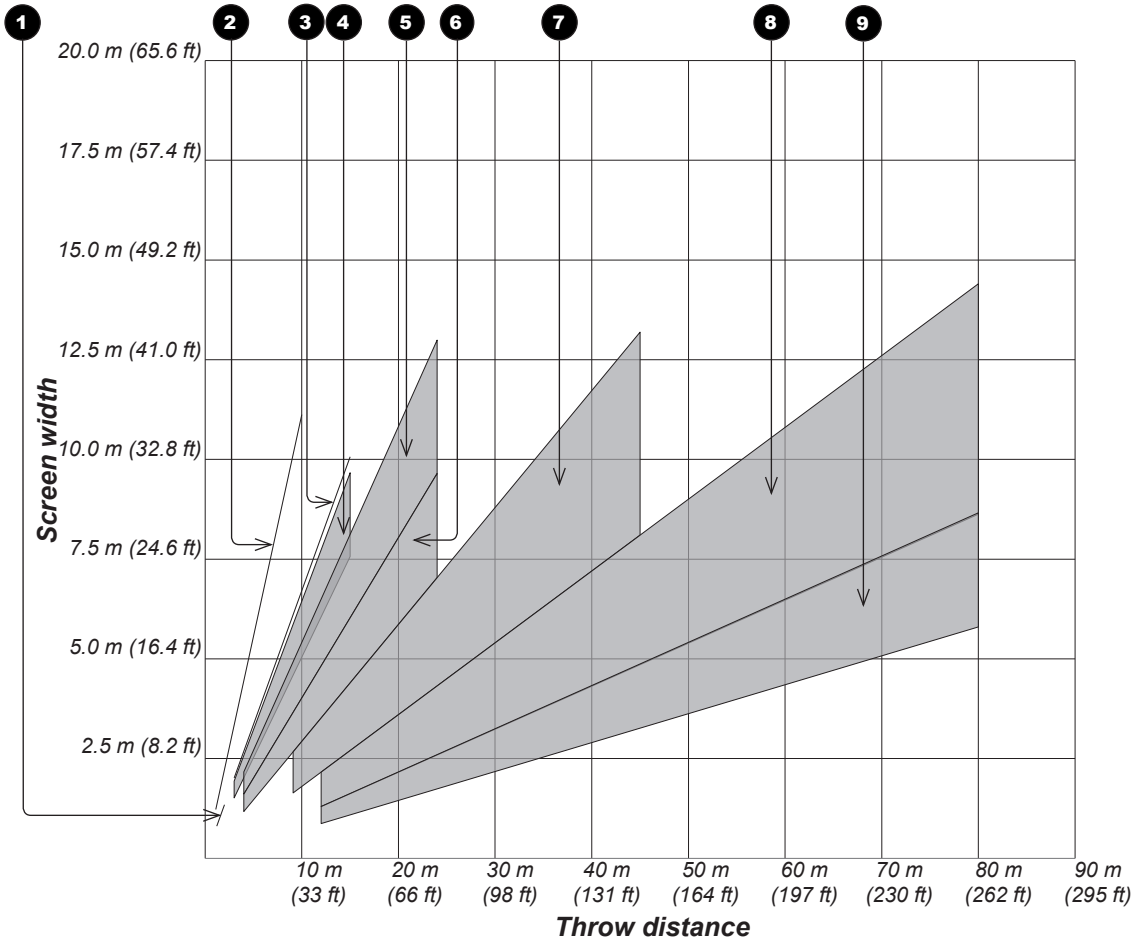
This chart has a TRF of 1.42, for use with the following images:



*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

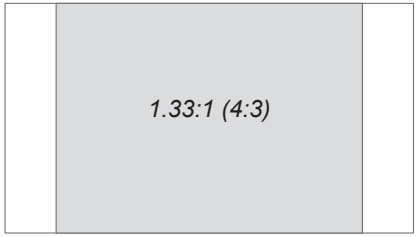
DMD™ resolution 1080p, 1.33:1 images

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **2.56 - 4.17 : 1 zoom lens**
8. **4.17 - 6.95 : 1 zoom lens**
9. **6.93 - 10.34 : 1 zoom lens**



Notes

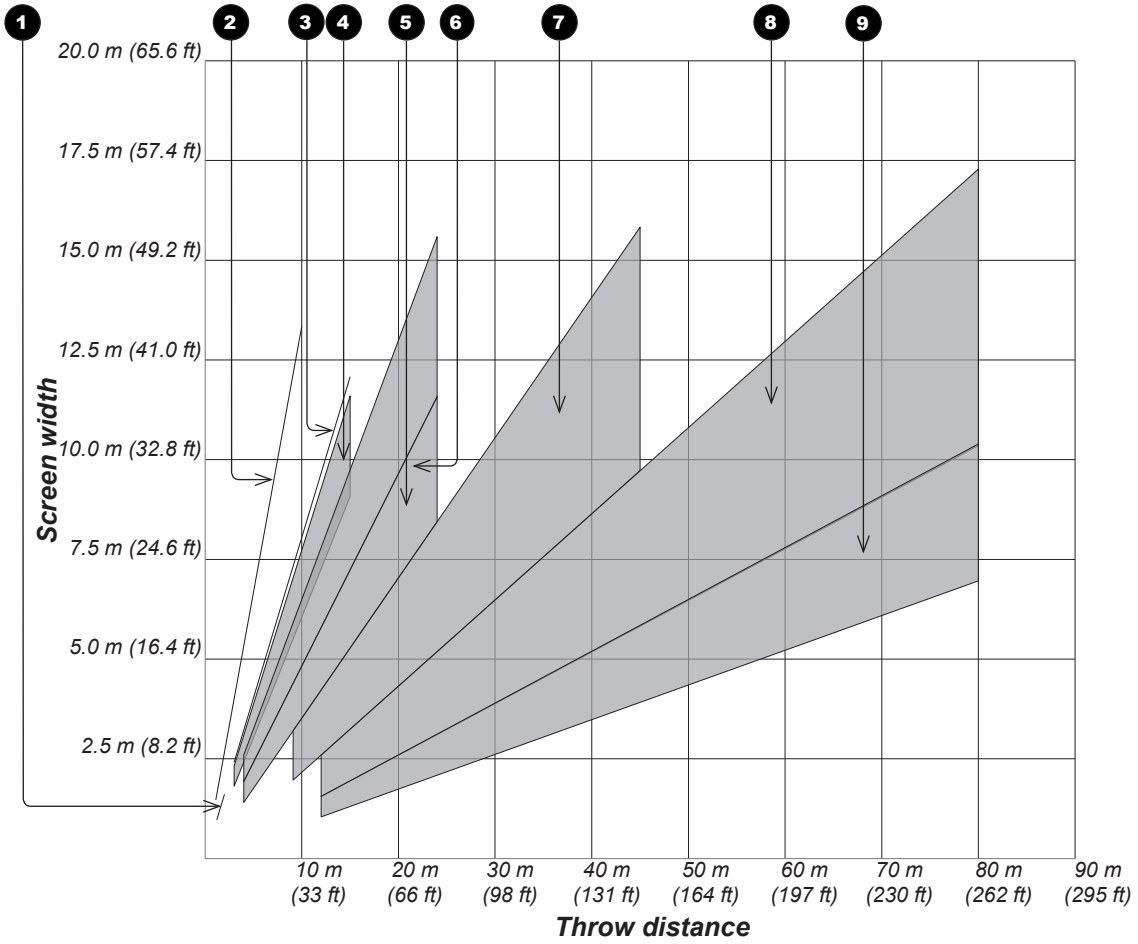
This chart has a TRF of 1.33, for use with the following images:



*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

DMD™ resolution 1080p, 1.6:1 images

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **2.56 - 4.17 : 1 zoom lens**
8. **4.17 - 6.95 : 1 zoom lens**
9. **6.93 - 10.34 : 1 zoom lens**



Notes

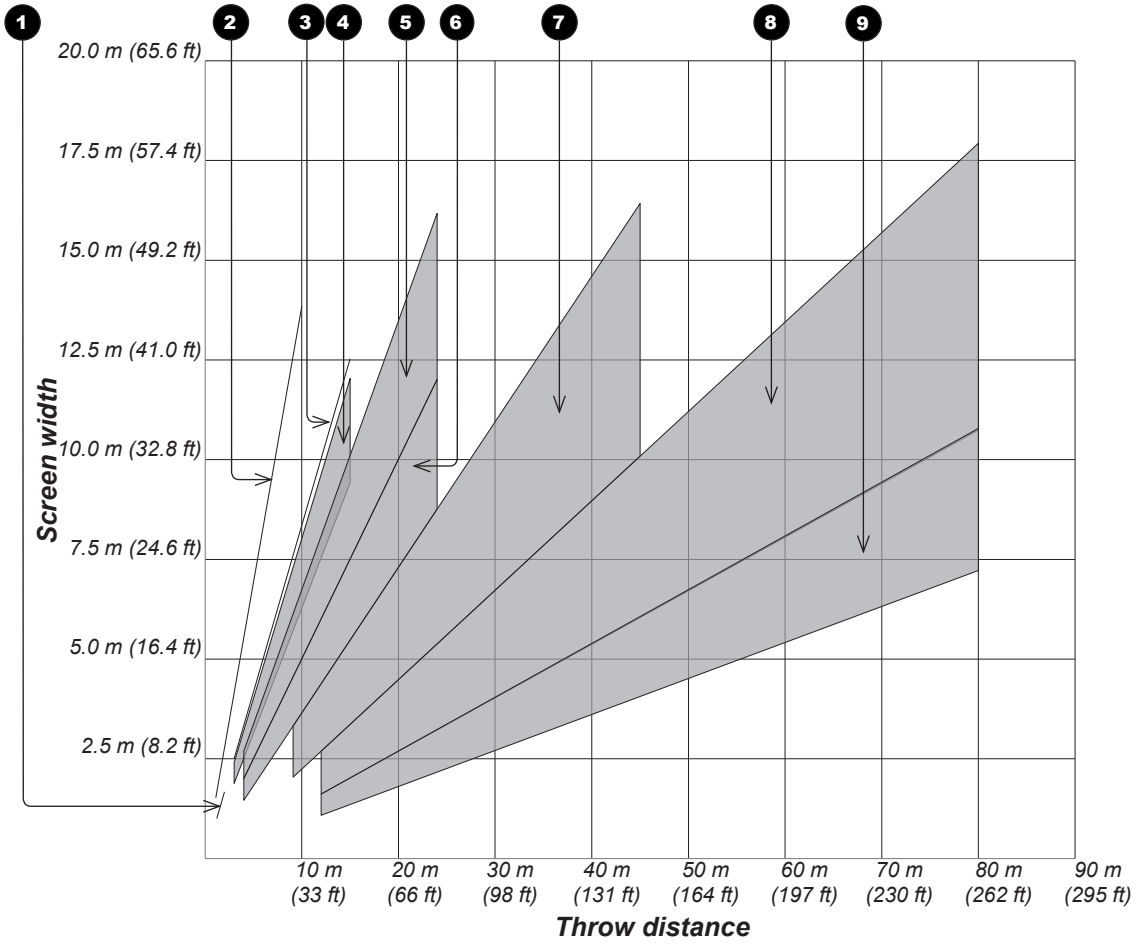
This chart has a TRF of 1.11, for use with the following images:

1.6:1 (16:10)

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

DMD™ resolution 1080p, 1.66:1 images

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **2.56 - 4.17 : 1 zoom lens**
8. **4.17 - 6.95 : 1 zoom lens**
9. **6.93 - 10.34 : 1 zoom lens**



Notes

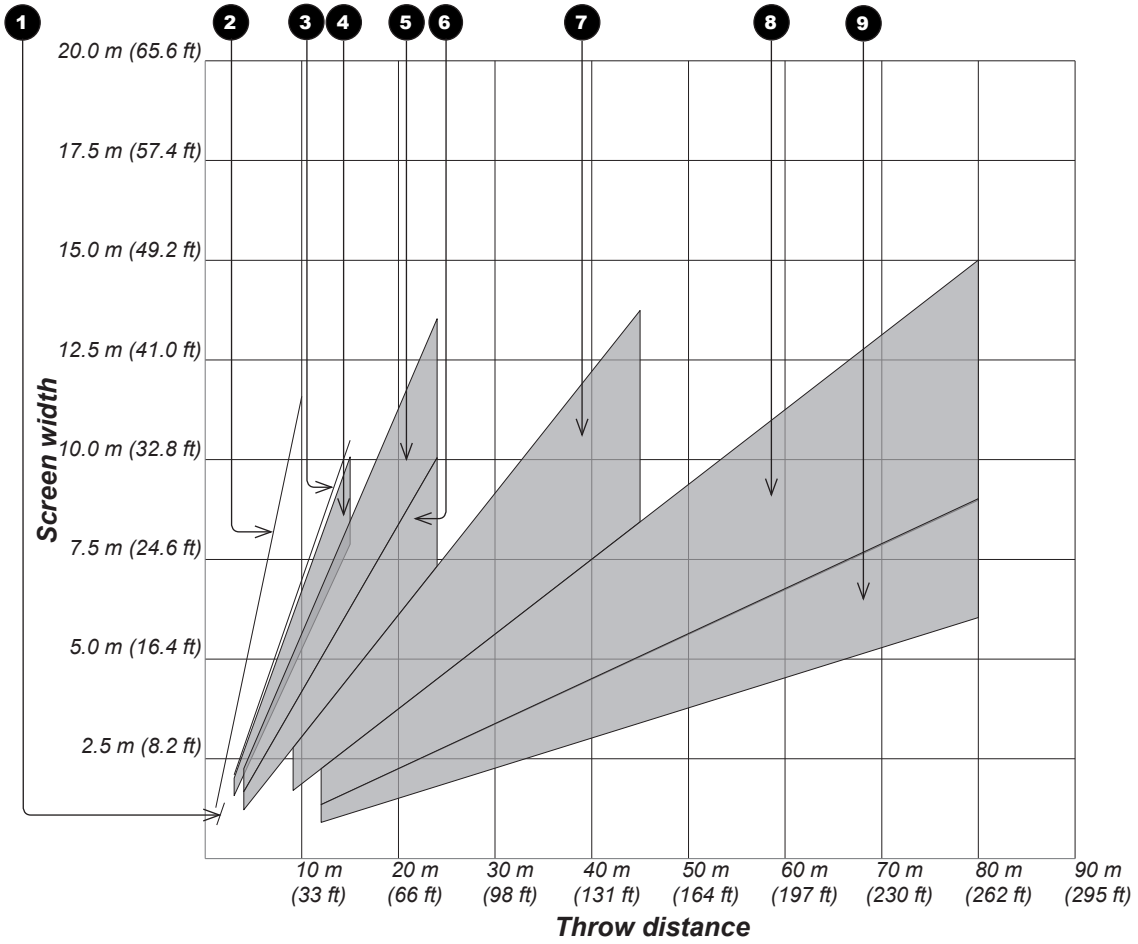
This chart has a TRF of 1.07, for use with the following images:

1.66:1 (Vista)

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

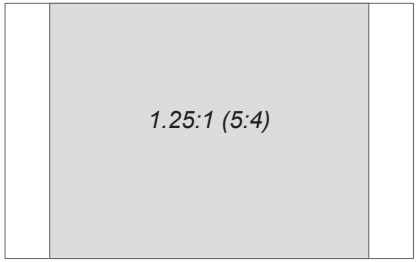
DMD™ resolution WUXGA, 1.25:1 images

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **2.56 - 4.17 : 1 zoom lens**
8. **4.17 - 6.95 : 1 zoom lens**
9. **6.93 - 10.34 : 1 zoom lens**



Notes

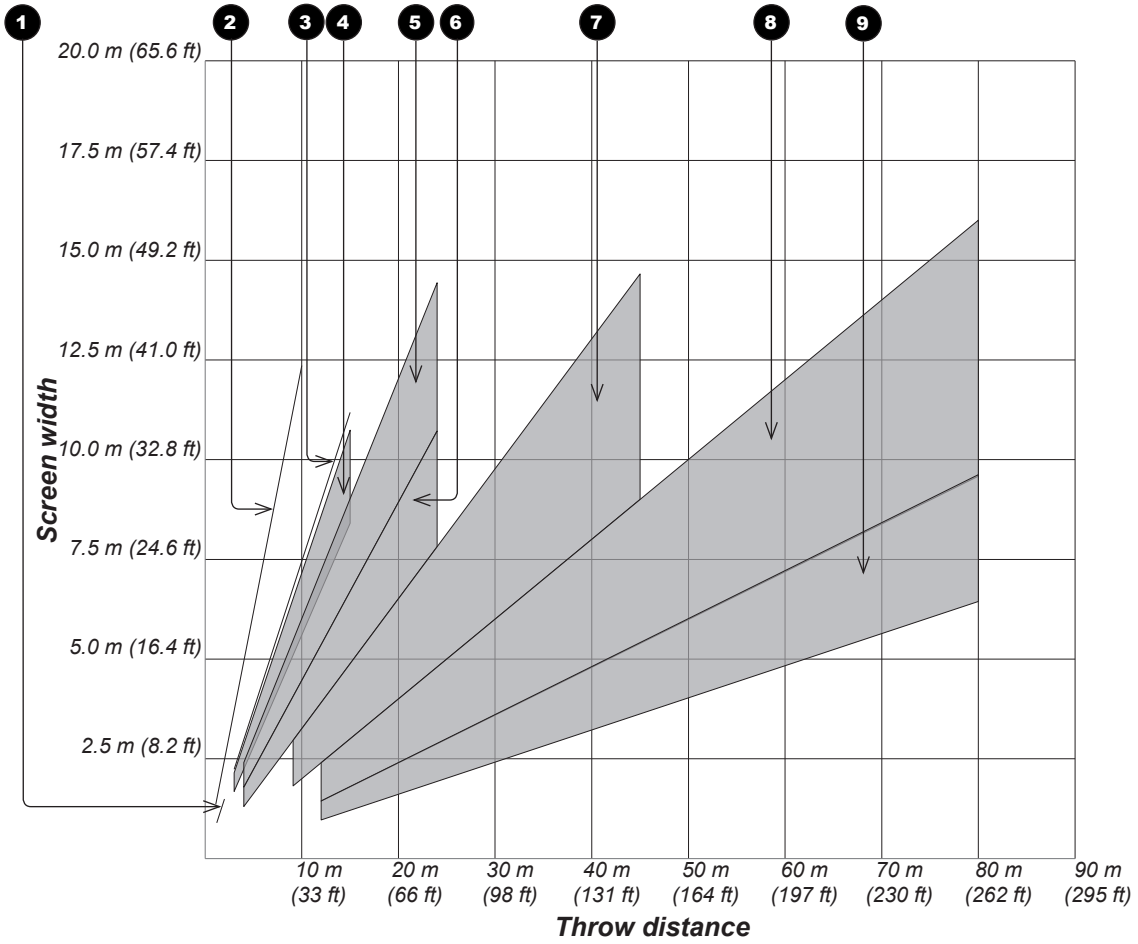
This chart has a TRF of 1.28, for use with the following images:



*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

DMD™ resolution WUXGA, 1.33:1 images

1. **1.12 : 1 fixed lens (short)**
2. **0.67 : 1 fixed lens**
3. **1.12 - 1 fixed lens**
4. **1.16 - 1.49 : 1 zoom lens**
5. **1.39 - 1.87 : 1 zoom lens**
6. **1.87 - 2.56 : 1 zoom lens**
7. **2.56 - 4.17 : 1 zoom lens**
8. **4.17 - 6.95 : 1 zoom lens**
9. **6.93 - 10.34 : 1 zoom lens**



Notes

This chart has a TRF of 1.2, for use with the following images:

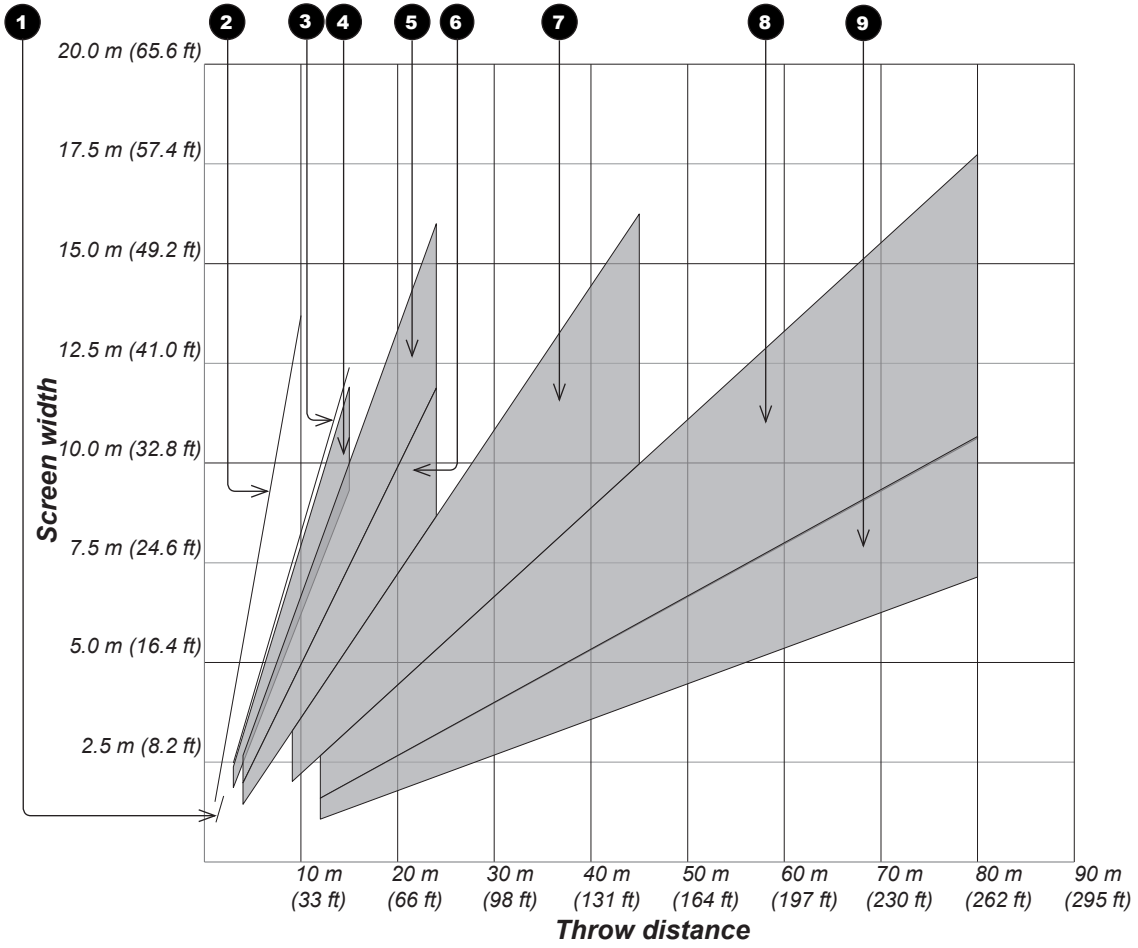
1.33:1 (4:3)

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

DMD™ resolution SX+, full width images

For SX+, full width images are 2.35:1 (Scope), 1.85:1 (Flat) 1.78:1 (16:9), 1.66:1 (Vista), 1.6:1 (16:10), and 1.33:1 (4:3, native aspect ratio).

1. **1.21 : 1 fixed lens (short)**
2. **0.73 : 1 fixed lens**
3. **1.21 - 1 fixed lens**
4. **1.26 - 1.61 : 1 zoom lens**
5. **1.5 - 2.02 : 1 zoom lens**
6. **2.02 - 2.77 : 1 zoom lens**
7. **2.77 - 4.51 : 1 zoom lens**
8. **4.51 - 7.53 : 1 zoom lens**
9. **7.5 - 11.2 : 1 zoom lens**



Notes

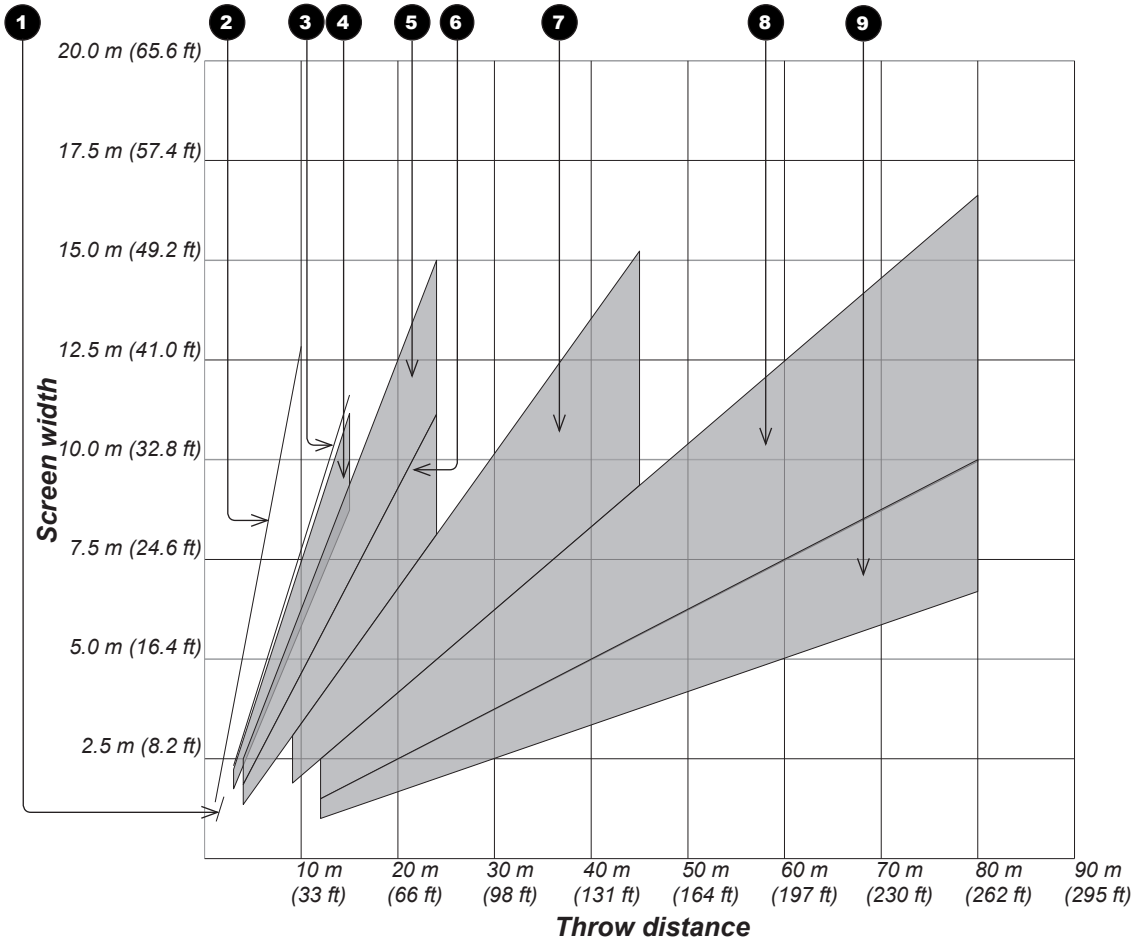
This chart has a TRF of 1.0, for use with the following images:

2.35:1 (Scope), 1.85:1 (Flat), 1.78:1 (16:9), 1.66:1 (Vista), 1.6:1 (16:10) and 1.33:1 (native)

*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

DMD™ resolution SX+, 1.25:1 images

1. **1.21 : 1 fixed lens (short)**
2. **0.73 : 1 fixed lens**
3. **1.21 - 1 fixed lens**
4. **1.26 - 1.61 : 1 zoom lens**
5. **1.5 - 2.02 : 1 zoom lens**
6. **2.02 - 2.8 : 1 zoom lens**
7. **2.77 - 4.51 : 1 zoom lens**
8. **4.51 - 7.53 : 1 zoom lens**
9. **7.5 - 11.2 : 1 zoom lens**



Notes

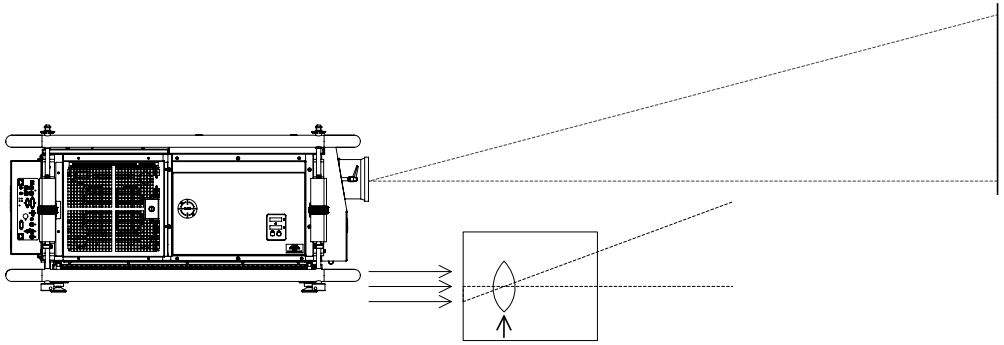
This chart has a TRF of 1.07, for use with the following images:

1.25:1 (5:4)

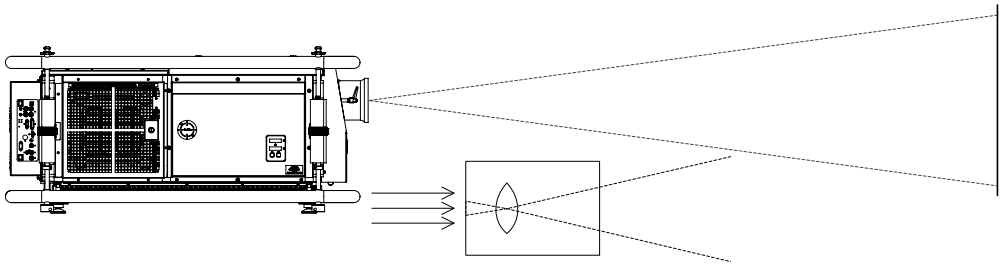
*For information about individual lens part numbers, see **Appendix A** at the end of this document.*

Positioning The Image

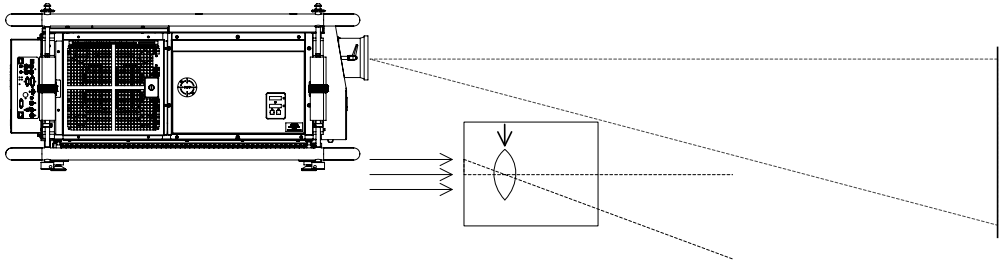
The normal position for the projector is at the centre of the screen. However, you can set the projector above or below the centre, or to one side, and adjust the image using the **Lens shift** feature (known as ***rising and falling front***) to maintain a geometrically correct image.



Shifting the lens up (rising front)



Centered lens



Shifting the lens down (falling front)

Notes

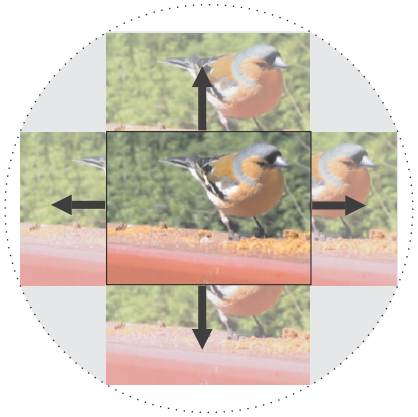
*For more information on shifting the lens, see **Lens Menu** in the **Operating Guide**.*

Whenever possible, position the projector so that the lens is centered for the highest quality image.

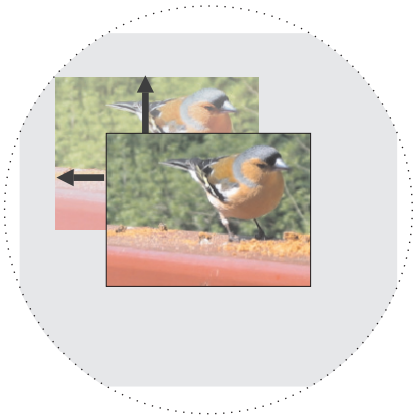
Positioning The Image (continued)

Any single adjustment outside the ranges specified on the following page may result in an unacceptable level of distortion, particularly at the corners of the image, due to the image passing through the periphery of the lens optics.

If the lens is to be shifted in two directions combined, the maximum range without distortion will be somewhat less, as can be seen in the illustrations below.



Full horizontal or vertical shift



Combined shift is reduced

Notes

*For more information on shifting the lens, see **Lens Menu** in the **Operating Guide**.*

Maximum offset range

The maximum offset range available with no distortion or vignetting is dependent on which lens is used. Shifting the lens beyond its undistorted limits may be physically possible, however you may experience some vignetting or distortion.

for WUXGA projectors	**vertical (pixels)**	**horizontal (pixels)**	**vertical (frames)**	**horizontal (frames)**
0.67 : 1 fixed lens	±130	±85	±0.108	±0.044
1.16 - 1.49 : 1 zoom lens	+490 / -390	±240	±0.408	±0.188
1.12 : 1 fixed lenses and all other zoom lenses	+570 / -390	±240	+0.475 / - 0.325	±0.125

for 1080p projectors	**vertical (pixels)**	**horizontal (pixels)**	**vertical (frames)**	**horizontal (frames)**
0.67 : 1 fixed lens	±190	±120	±0.176	±0.063
1.16 - 1.49 : 1 zoom lens	+540 / -405	±240	+0.5 / - 0.375	±0.125
1.12 : 1 fixed lenses and all other zoom lenses	+540 / -405	±240	+0.5 / - 0.375	±0.125

for SX+ projectors	**vertical (pixels)**	**horizontal (pixels)**	**vertical (frames)**	**horizontal (frames)**
0.73 : 1 fixed lens	±120	±95	±0.114	±0.068
1.26 - 1.61 : 1 zoom lens	±380	±175	±0.362	±0.125
1.21 : 1 fixed lenses and all other zoom lenses	+525 / -394	±175	+0.5 / - 0.375	±0.125

Notes

*For more information on shifting the lens, see **Lens menu** in the **Operating Guide***

Input Connections

Inputs 1-8, on the rear of the projector, are limited input frame rates up to 60Hz, but provide access to the full geometric adjustment capabilities, including Blend and Warp. The side inputs, 9, 10 and 11 provide a very direct path to the DMD™ display, with minimal latency and high frame rate capability. Inputs 9,10 and 11 therefore provide more limited geometrical adjustment than Inputs 1-8.

Inputs 1-8

To get the best possible image from a source it is important to use the highest quality connection. The following lists show the inputs sorted by highest quality connection first:

Computer source

- **HDMI** *(input 2)*
  Receives digital signal from HDMI-compliant devices. The audio from an HDMI source is available on the SPDIF output.
- **DVI** *(input 3)*
  This is a DVI-I input, which can receive either analog (DVI-A) or digital (DVI-D) signal from a compatible source. See the ***Connection Guide*** for instructions on how to configure this input for your source.
- **VGA** *(input 1)*
  Receives analog signal from a computer. When using this input, it is best to use a fully wired VGA cable to connect the source to the projector. This will allow the source to determine the projector's capabilities via DDC and show an optimized image. Such cables can be identified as they have a blue connector shell.

Video source

- **3G-SDI** *(input 4)*
  Uses a BNC connector to receive uncompressed, unencrypted digital video.
- **Component** *(input 7)*
  RGsB or RGBS, or YPbPr
- **S-Video** *(input 6)*
  Uses a 4-pin mini-DIN connector.
- **CVBS1** *(input 5)*
  Uses a BNC connector to receive composite video.
- **CVBS2** *(input 8)*
  Uses an RCA phono connector to receive composite video.

Notes

DVI inputs

Input 3, single link DVI-D

Sources up to 1920x1200 resolution; 24-60Hz; up to 12 bits per color. Supports HDCP.

Input 9, dual link DVI-D

An input with increased frame rate.

Sources up to 1920x1200 resolution; 24-160Hz. Supports HDCP.

Input 10, HDMI-compatible DVI-D

Sources up to 1920x1200 resolution; up to 12 bits per color; 24-60Hz.

Input 11, Dual Pipe 3D

Two single input connections.

Sources up to 1920x1200 resolution; at frame rates consistent with up to 148.5 Megapixels/sec/pipe (including blanking).

(Use MAIN for left eye video stream and SUB input for right eye video stream.)

Notes

WUXGA (1920x1200) is only available at 50 and 60Hz on Input 3. For WUXGA 3D, we recommend the use of Input 9.

There is no scaler on Inputs 9-11.

Images up to and including the native resolution of the display will be displayed pixel for pixel and centred.

This enables the projector to maximise the image bandwidth and grayscale resolution.

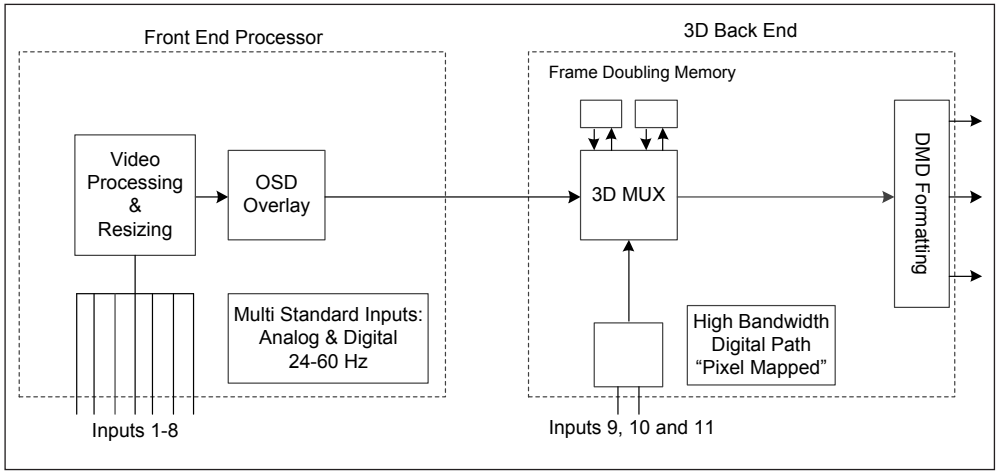
Special considerations when using Inputs 9-11

Differences between Inputs 9-11 and Inputs 1-8

Inputs 9 and 10 have been designed to offer access to a very high bandwidth digital video path, free of the limitations inherent to standard image processing techniques. As such, the image is pixel-mapped directly to each DMD™, so only a subset of the image settings applies to Inputs 9-11.

Global settings, such as input selection, lens and lamp control are all applicable to Inputs 9-11 but modal settings are not.

Input and processing architecture



EDID on the DVI and VGA inputs

If you are using a computer DVI card or another source that obeys the EDID protocol, the source will automatically configure itself to suit the projector.

Otherwise please refer to the documentation supplied with the source to manually set the resolution to the DMD™ resolution of the projector or the nearest suitable setting. Switch off the source, connect to the projector, then switch the source back on again.

Notes

There is no scaler on Inputs 9-11.

Images up to and including the native resolution of the display will be displayed pixel for pixel and centred.

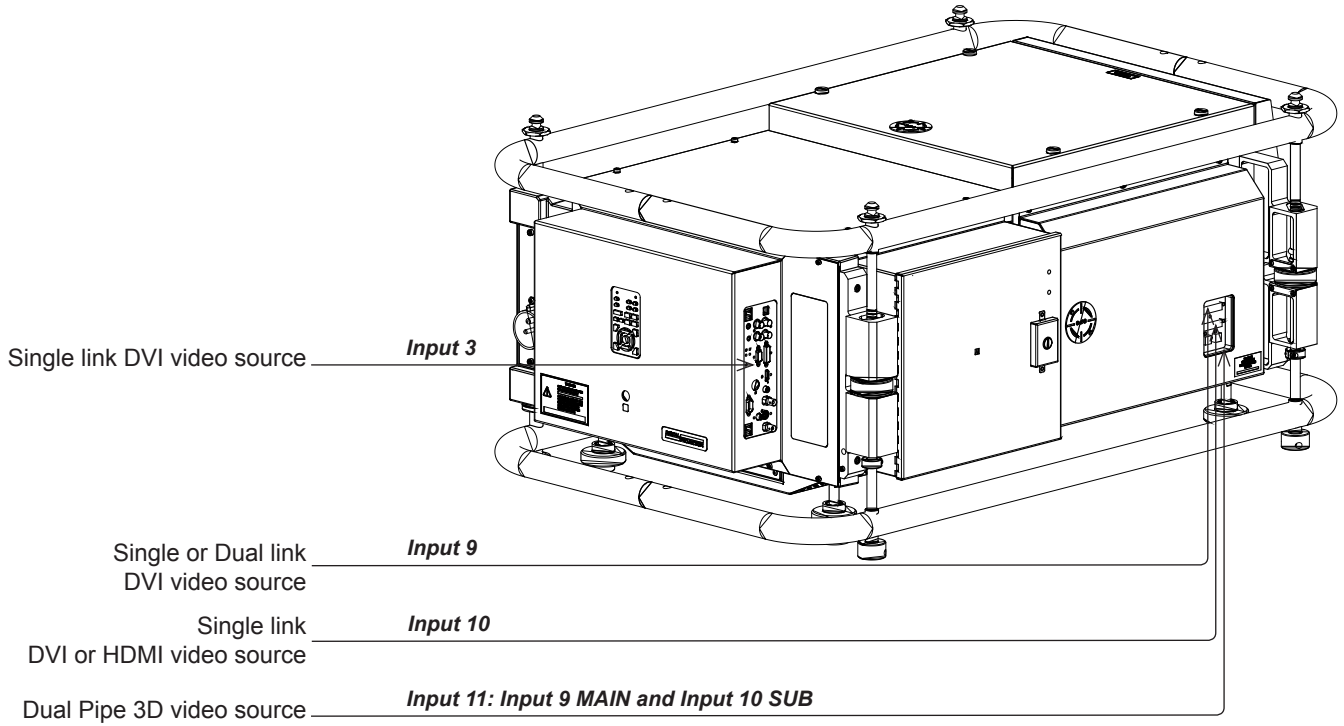
This enables the projector to maximise the image bandwidth and grayscale resolution.

Global settings are indicated by a globe icon in the OSD and affect all inputs.

Modal settings only affect the currently displayed input.

Connection examples

DVI Input connection example

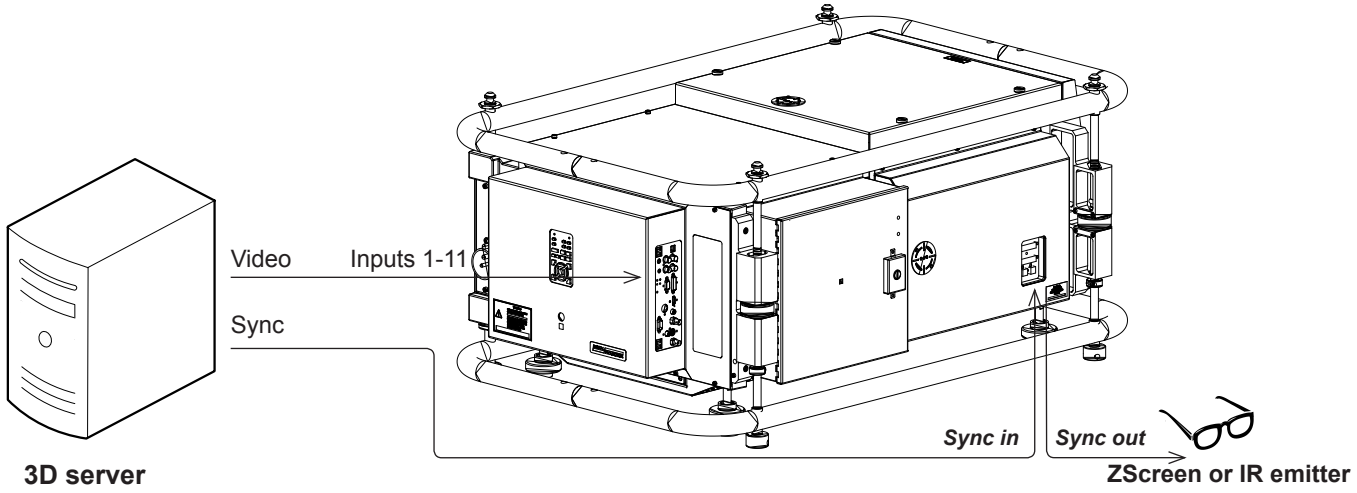

Single link DVI video source
Input 3
Single or Dual link DVI video source
Input 9
Single link DVI or HDMI video source
Input 10
Dual Pipe 3D video source
Input 11: Input 9 MAIN and Input 10 SUB

Notes

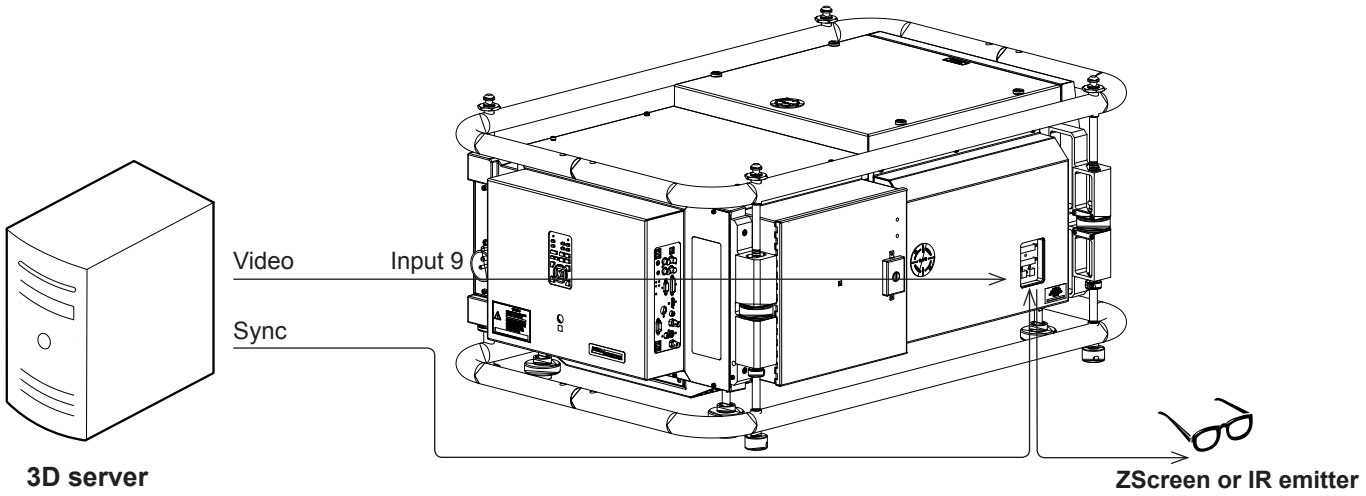
Dual link DVI: high bandwidth/frame rate

3D connection examples

3D sources up to 60Hz, requiring frame doubling and left/right interleaving



3D sources above 60Hz



Notes

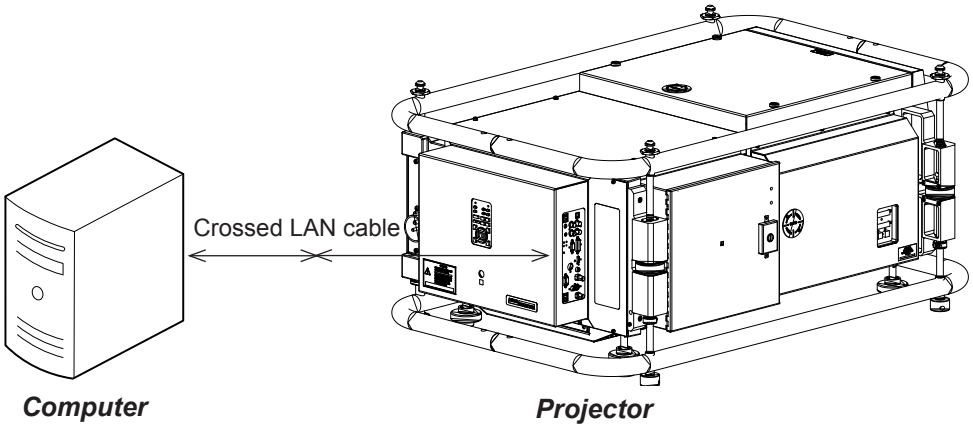
Use inputs 1-8 if the geometry of the image needs to be adjusted.

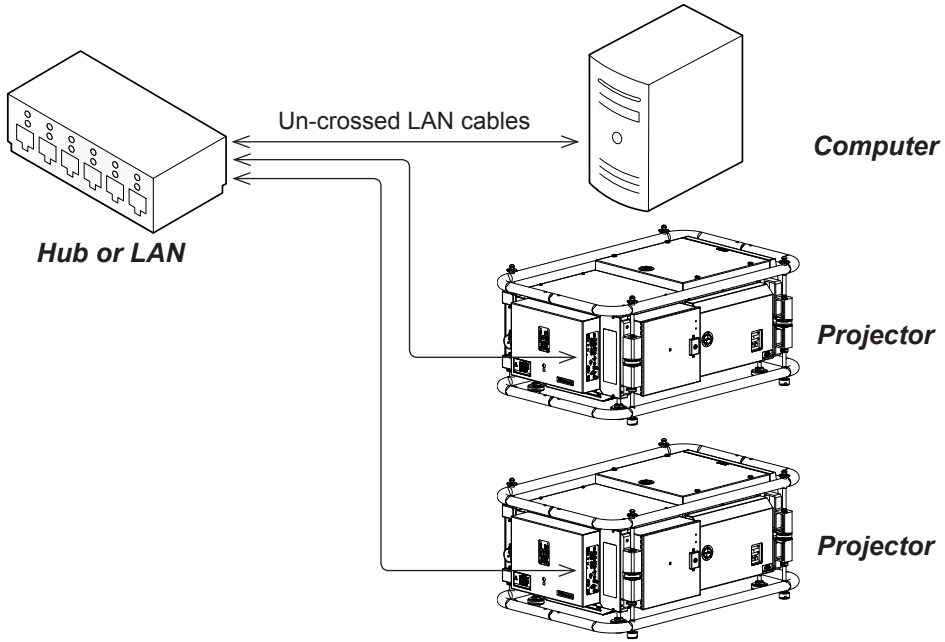
*For more information on 3D settings, see the **3D Setup** section further in this guide.*

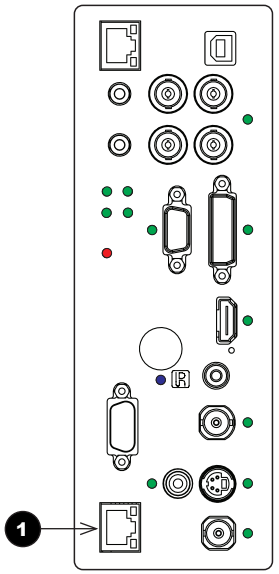
Control Connections

LAN connection

The projector's features can be controlled via a LAN connection, using a standard internet browser package such as Internet Explorer.





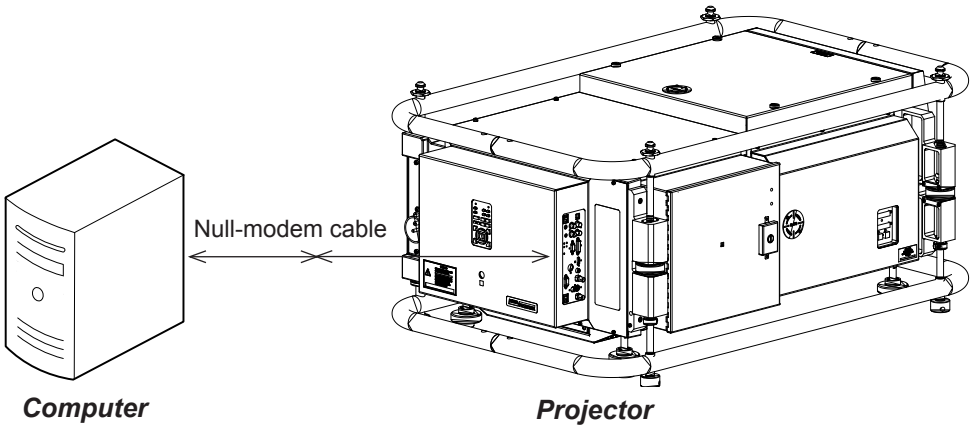


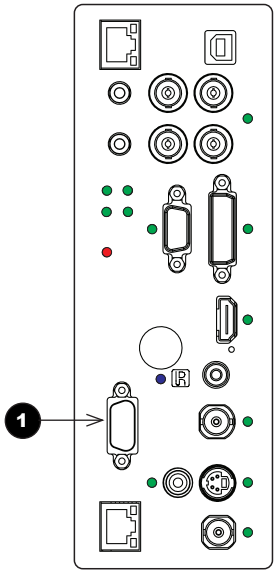
Rear connection panel

1 **LAN**

Notes

RS232 connection





Rear connection panel

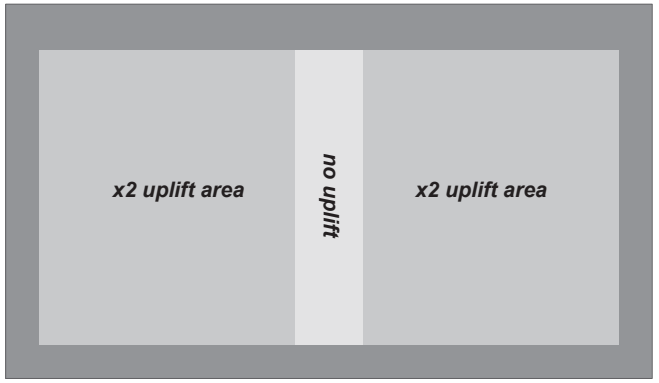
1 **RS232**

Notes

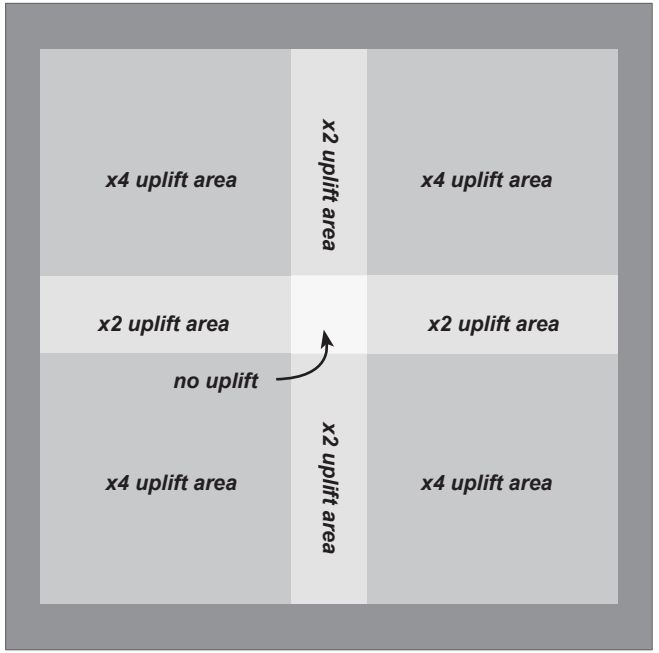
Edge Blend And Black Level Uplift

The **Edge Blend** setting is used to improve the appearance of multi-projector displays, by blending overlapping edges to present a seamless image.

When several projectors are used to create a large tiled image, the overlapping edges may appear brighter than the rest of the image. As it is not possible for any projector to produce an absolute black, any 'black' areas in the overlapped edges may appear slightly less dark than those in the rest of the image. **Black Level Uplift** can be used to counteract this effect, by raising the black level of the rest of the image. The amount of uplift required will be either x2 or x4, depending on how many images are overlapped, as shown in the examples on this page.



Two projectors sharing one overlapping edge



Four projectors with overlapping edges

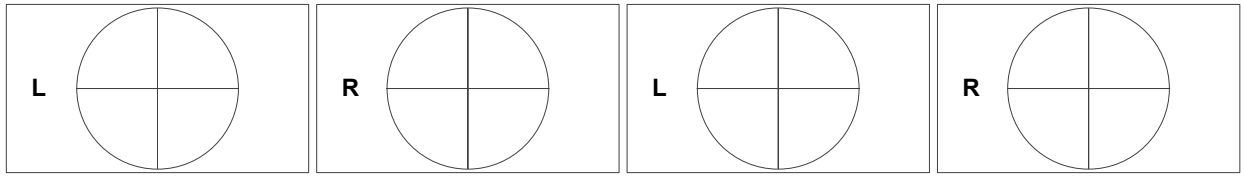
Notes

3D Setup

In most situations you can use the **Auto** setting to have the projector automatically detect the format. Otherwise, consider the notes below to help you set up the 3D input manually.

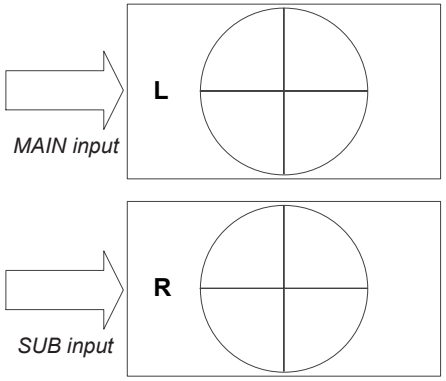
The following 3D formats are supported:

- **Sequential**
  Main will accept frame rates up to 160Hz. Lower frame rates can be multiplied for display. An example would be 60Hz (30 frames per eye in Left-Right sequence (L1, R1, L2, R2…) with **Frame Rate Multiplier** set to 2x, resulting in a displayed sequence at 120Hz (L1, R1, L1, R1, L2, R2, L2, R2…). **Sub** can accept frame rates up to 60Hz and frame-multiply in a similar manner.
  Frame Rate Multiplier should never be set to result in a displayed frame rate above 160Hz - doing so will result in an image error.
  For sequential 3D, an external sync is required to identify left and right frames. If no sync is available from the sequential source, the projector will generate an output sync, but it may then be necessary to manually reset the dominance each time the player is started.



Sequential

- **Dual Pipe (MAIN and SUB)**
  The left and right eye images are delivered on two separate DVI links, which the projector will interleave for 3D display.

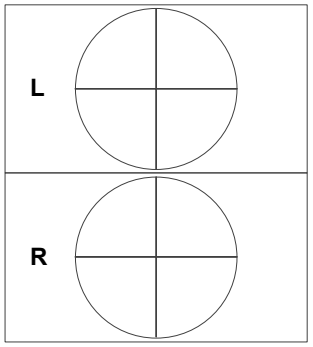


Dual Pipe

Notes

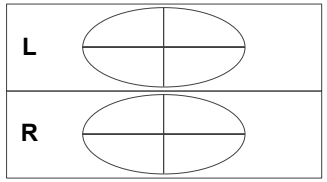
3D may not be present on some models

- **Frame Packing**
  This format will be detected, re-synchronised, frame-multiplied and displayed at 144Hz with the left eye / right eye dominance automatically extracted from the video data. You need to optimize **Dark Time** and **Sync Offset** manually to suit your chosen switching glasses. You also need to set an appropriate frame rate multiplication: for **Frame Packing**, we recommend **3x**.)



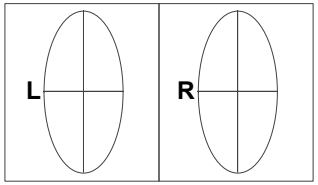
Frame Packing

- **Top-and-Bottom**
  Sets the projector to reformat the video frames and map them to the display with the left eye / right eye dominance automatically extracted from the video data. You need to optimize **Dark Time** and **Sync Offset** manually to suit your chosen switching glasses. You also need to set an appropriate frame multiplication: for a 60Hz **Top-and-Bottom** source **Frame Rate Multiplier** should be set to **1x** because the two halves of the image will automatically be extracted to create a displayed rate of twice the input rate.



Top-and-Bottom

- **Side-by-Side (Half)**: interlaced and progressive, 50 and 60Hz
  The side-by-side image will be de-interlaced (if appropriate), resized and then sequentially displayed at 100 or 120Hz. The left eye / right eye dominance will be automatically extracted from the video data, however you will need to optimize **Dark Time** and **Sync Offset** manually to suit your chosen switching glasses.
  When 3D is disabled, 1080i will be treated conventionally. For a 60Hz **Top-and-Bottom** source **Frame Rate Multiplier** should be set to **1x** because the two halves of the image will automatically be extracted to create a displayed rate of twice the input rate.



Side-by-Side (Half)

Dark Time and **Sync Offset** need to be set only once, to optimize the image for the glasses in use.

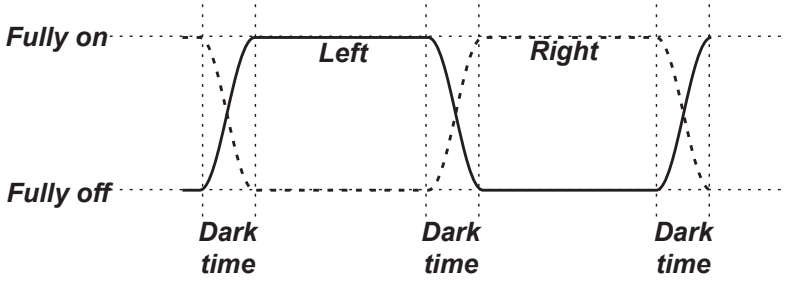
Notes

3D may not be present on some models

Some 3D settings explained

Dark Time

Ghosting can be caused by the left and right images overlapping during the time that the ZScreen or 3D glasses are switching. **Dark Time** allows you to minimize this effect.



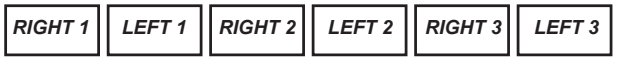
Source Dominance

The outgoing 3D frames are in pairs - the dominant frame being presented first. You can determine which frame should be the dominant one.

By convention the default setting is **Left**.

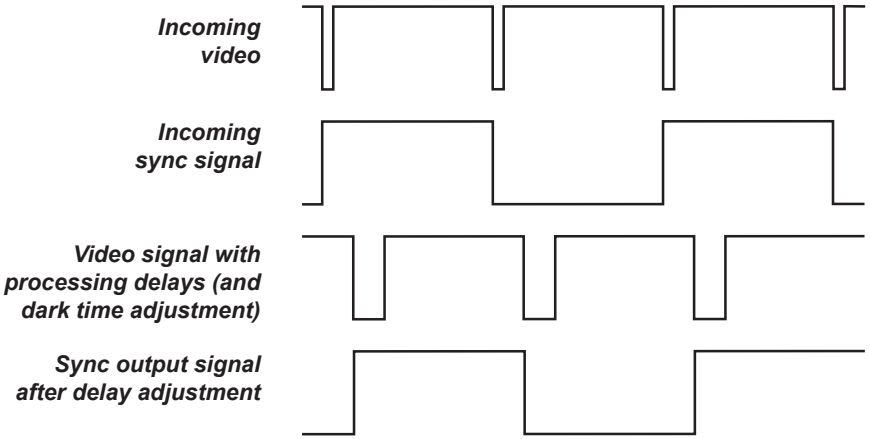
Dominance Left

Dominance Right



Sync Offset

The sync signal from the 3D server will be in phase with the frames generated by its graphics card. However, to compensate for processing delays in the projector, **Sync Offset** introduces a delay to the sync output signal sent to the ZScreen or 3D glasses.


Incoming video
Incoming sync signal
Video signal with processing delays (and dark time adjustment)
Sync output signal after delay adjustment

Notes

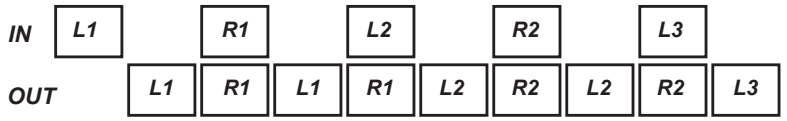
3D may not be present on some models

In order to achieve maximum light output and a smooth grayscale, whilst eliminating ghosting, the following procedure is recommended:

1. *Set the* **Dark Time** *to a value appropriate to the glasses or ZScreen, say 650* µS *or 1300* µS.
2. *Adjust the* **Sync Offset** *time to eliminate ghosting and achieve a smooth grayscale.*
3. *Repeat steps 1 and 2 until the best result is obtained.*

Frame Rate Multiplier

If the 3D video is available only at low frame rates, it will be necessary to multiply the frame rate to obtain a flicker-free image. For example, a 60Hz frame rate can be doubled to 120Hz, or a 48Hz frame rate could be tripled to 144Hz.



x2 example

Notes

3D may not be present on some models.

Appendix A: Lens Part Numbers

Throw ratios for 1080p and WUXGA projectors	Throw ratios for SX+ projectors	Lens extension (±2%)	Throw distance range	Part number for High Brightness lens	Part number for High Contrast lens
0.67 : 1 fixed lens	0.73 : 1 fixed lens	204 mm (8.0 in)	1.1 - 3.2m (3.6 - 10.5ft)	105-607	107-195
1.12 : 1 fixed lens (3 - 15 m)	1.21 : 1 (3 - 15m) fixed lens	268 mm (10.6 in)	3 - 15m (9.8 - 49.2ft)	105-608	105-608
1.12 : 1 fixed lens (1.2 - 2m)	1.21 : 1 (1.2 - 2.0m) fixed lens	268 mm (10.6 in)	1.2 - 2m (3.9 - 6.6ft)	105-609	105-609
1.16 - 1.49 : 1 zoom lens	1.26 - 1.61 : 1 zoom lens	226 mm (8.9 in)	3 - 15m (9.8 - 49.2ft)	109-236	109-359
1.39 - 1.87 : 1 zoom lens	1.5 - 2.02 : 1 zoom lens	194 mm (7.6 in)	4 - 24m (13.1 - 78.7ft)	105-610	107-196
1.87 - 2.56 : 1 zoom lens	2.02 - 2.77 : 1 zoom lens	159 mm (6.3 in)	4 - 24m (13.1 - 78.7ft)	105-611	107-197
2.56 - 4.17 : 1 zoom lens	2.77 - 4.51 : 1 zoom lens	145 mm (5.7 in)	9.1 - 45m (29.9 - 147.6ft)	105-612	107-198
4.17 - 6.95 : 1 zoom lens	4.51 - 7.53 : 1 zoom lens	129 mm (5.1 in)	12 - 80m (39.4 - 262.5ft)	105-613	107-199
6.93 - 10.34 : 1 zoom lens	7.5 - 11.2 : 1 zoom lens	179 mm (7.0 in)	12 - 80m (39.4 - 262.5ft)	109-235	109-358

Notes

The Throw ratio for a particular lens is fixed, but assumes that the image fills the width of the DMD.

For images that do not fill the width of the DMD, the throw ratio is effectively increased. To correct for this in these calculations, a throw ratio factor (TRF) is used.

Throw distance calculations are based on the distance from the outer end of the lens, which will vary from lens to lens.

The High Brightness lenses are recommended for the standard models, for maximum light output.

The High Contrast lenses are recommended for the Ultra Contrast models, for maximum contrast.

Lens extension is measured when the lens is focussed at infinity, and fully extended. At other focus settings, the extension could be up to 10mm less.

Appendix B: Supported Signal Input Modes

2D input modes

Standard		Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Composite 1 & 2 / S-Video	Component	DVI-A / VGA	DVI-D / HDMI	3G-SDI
SDTV	480i	720 x 480	59.94	525	15.73	✓	✓			✓
	576i	720 x 576	50.00	625	15.63	✓	✓			✓
EDTV	480p59	720 x 480	59.94	525	31.47		✓		✓	✓
	480p60	720 x 480	60.00	525	31.50		✓		✓	✓
	576p50	720 x 576	50.00	625	31.25		✓		✓	✓
HDTV	720p50	1280 x 720	50.00	750	37.50		✓		✓	✓
	720p59	1280 x 720	59.94	750	44.96		✓		✓	✓
	720p60	1280 x 720	60.00	750	45.00		✓		✓	✓
	1080s23	1920 x 1080	23.98	1125	26.97		✓		✓	✓
	1080p23	1920 x 1080	23.98	1125	26.97		✓		✓	✓
	1080s24	1920 x 1080	24.00	1125	27.00		✓		✓	✓
	1080p24	1920 x 1080	24.00	1125	27.00		✓		✓	✓
	1080p25	1920 x 1080	25.00	1125	28.13		✓		✓	✓
	1080p29	1920 x 1080	29.97	1125	33.72		✓		✓	✓
	1080p30	1920 x 1080	30.00	1125	33.75		✓		✓	✓
	1080i50	1920 x 1080	50.00	1125	28.13		✓		✓	✓
	1080p50	1920 x 1080	50.00	1125	56.25		✓		✓	✓
	1080i59	1920 x 1080	59.94	1125	33.72		✓		✓	✓
	1080p59	1920 x 1080	59.94	1125	67.43		✓		✓	✓

Notes

Standard		Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Composite 1 & 2 / S-Video	Component	DVI-A / VGA	DVI-D / HDMI	3G-SDI
HDTV continued	1080i60	1920 x 1080	60.00	1125	33.75		✓		✓	✓
	1080p60	1920 x 1080	60.00	1125	67.50		✓		✓	✓
COMPUTER	VGA59	640 x 480	59.94	525	31.47			✓	✓	
	VGA60	640 x 480	60.00	525	31.50			✓	✓	
	MACI	640 x 480	66.67	525	35.00			✓	✓	
	VGA72	640 x 480	72.81	520	37.86			✓	✓	
	VGA75	640 x 480	75.00	500	37.50			✓	✓	
	DOS70	720 x 400	70.09	449	31.47			✓	✓	
	SVGA50	800 x 600	49.92	621	31.00			✓	✓	
	SVGA56	800 x 600	56.25	625	35.16			✓	✓	
	SVGA60	800 x 600	60.32	628	37.88			✓	✓	
	SVGA72	800 x 600	72.19	666	48.08			✓	✓	
	SVGA75	800 x 600	75.00	625	46.88			✓	✓	
	MACII	832 x 624	75.08	1120	49.10			✓	✓	
	XGA50	1024 x 768	49.98	793	39.63			✓	✓	
	XGA60	1024 x 768	60.00	806	48.36			✓	✓	
	XGA70	1024 x 768	70.07	806	56.48			✓	✓	
	XGA75	1024 x 768	75.03	800	60.02			✓	✓	
	XGA+70	1152 x 864	70.01	912	63.85				✓	
	XGA+75	1152 x 864	75.00	900	67.50				✓	
	MAC2	1152 x 870	75.06	915	68.68			✓	✓	
	SUN1166	1152 x 900	66.00	937	61.85			✓	✓	

Notes

Standard		Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Composite 1 & 2 / S-Video	Component	DVI-A / VGA	DVI-D / HDMI	3G-SDI
COMPUTER continued	WXGA50	1280 x 720	49.83	744	37.07				✓	
	WXGA60	1280 x 720	59.86	748	44.77				✓	
	WXGA50	1280 x 768	49.92	793	39.59				✓	
	WXGA60	1280 x 768	59.87	798	47.78				✓	
	SXGA-60	1280 x 960	60.00	1000	60.00				✓	
	SXGA50	1280 x 1024	49.84	1057	52.68			✓	✓	
	SXGA60	1280 x 1024	60.02	1066	63.98			✓	✓	
	SXGA75	1280 x 1024	75.02	1066	79.98			✓	✓	
	HD50	1360 x 768	49.89	793	39.56				✓	
	HD60	1360 x 768	59.80	798	44.72				✓	
	SXGA+50	1400 x 1050	49.97	1083	54.12			✓	✓	
	SXGA+60	1400 x 1050	59.98	1089	65.32			✓	✓	
	WSXGA50	1536 x 960	49.93	991	49.48				✓	
	WSXGA60	1536 x 960	59.91	996	59.67				✓	
	UXGA50	1600 x 1200	49.92	1238	61.78			✓	✓	
	UXGA60	1600 x 1200	60.00	1250	75.00			✓	✓	
	WSXGA+60	1680 x 1050	59.95	1089	65.29				✓	
	FHD50	1920 x 1080	49.92	1114	55.62			✓	✓	
	FHD60	1920 x 1080	59.93	1125	66.59			✓	✓	
	WUXGA50	1920 x 1200	49.93	1238	61.81			✓	✓	
	WUXGA60	1920 x 1200	59.95	1235	74.04			✓	✓	

Notes

3D input modes

Standard	Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Main / DVI	Sub / HDMI	Dual Pipe	DVI-A / VGA / Component	DVI-D / HDMI	3G-SDI
720p50 Frame Packing	1280 x 720	50.00	1470	37.50	✓	✓				
720p59 Frame Packing	1280 x 720	59.94	1470	44.96	✓	✓				
720p60 Frame Packing	1280 x 720	60.00	1470	45.00	✓	✓				
720p50 Top-and-Bottom	1280 x 720	50.00	750	37.50	✓	✓		✓	✓	✓
720p59 Top-and-Bottom	1280 x 720	59.94	750	44.96	✓	✓		✓	✓	✓
720p60 Top-and-Bottom	1280 x 720	60.00	750	45.00	✓	✓		✓	✓	✓
1080p23 Frame Packing	1920 x 1080	23.98	2205	26.97	✓	✓				
1080p24 Frame Packing	1920 x 1080	24.00	2205	27.00	✓	✓				
1080i50 Side-by-Side (Half)	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080i59 Side-by-Side (Half)	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080i60 Side-by-Side (Half)	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p50 Side-by-Side (Half)	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080p59 Side-by-Side (Half)	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080p60 Side-by-Side (Half)	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p50 Top-and-Bottom	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080p59 Top-and-Bottom	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080p60 Top-and-Bottom	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p50 Frame Sequential	1920 x 1080	50.00	1125	56.25	✓	✓		✓	✓	✓
1080p59 Frame Sequential	1920 x 1080	59.94	1125	67.43	✓	✓		✓	✓	✓
1080p60 Frame Sequential	1920 x 1080	60.00	1125	67.50	✓	✓		✓	✓	✓
1080p23 Dual Pipe	1920 x 1080	23.98	1125	26.97			✓			
1080p24 Dual Pipe	1920 x 1080	24.00	1125	27.00			✓			

Notes

3D may not be present on some models.

Only the Sub / HDMI input supports HDMI 1.4 3D formats.

Geometric correction is only available when using frame sequential formats on the DVI-A / VGA / Component / DVI-D / HDMI / 3G-SDI inputs.

Standard	Resolution	Vertical Frequency (Hz)	Total number of lines	Horizontal Frequency (kHz)	Main / DVI	Sub / HDMI	Dual Pipe	DVI-A / VGA / Component	DVI-D / HDMI	3G-SDI
1080p25 Dual Pipe	1920 x 1080	25.00	1125	28.13			✓			
1080p30 Dual Pipe	1920 x 1080	30.00	1125	33.75			✓			
1080p50 Dual Pipe	1920 x 1080	50.00	1125	56.25			✓			
1080p59 Dual Pipe	1920 x 1080	59.94	1125	67.43			✓			
1080p60 Dual Pipe	1920 x 1080	60.00	1125	67.50			✓			

Notes

3D may not be present on some models.

Only the Sub / HDMI input supports HDMI 1.4 3D formats.

Geometric correction is only available when using frame sequential formats on the DVI-A / VGA / Component / DVI-D / HDMI / 3G-SDI inputs.

Appendix C: Glossary Of Terms

Notes

1080p

An ***HDTV resolution*** which corresponds to 1920 x 1080 pixels (a widescreen ***aspect ratio*** of 16:9).

3D active glasses

Wireless battery-powered glasses with LCD shutters. Synchronization information is communicated to the glasses by means of an infrared (IR) or radio frequency (RF) emitter which is connected to the Sync Out terminal on the projector. IR or RF pulses are transmitted by the emitter to signal when the left eye and right eye images are being displayed. The glasses incorporate a sensor which detects the emitter's signal and synchronises the left and right eye shutters with the projected image.

3D passive glasses

Passive glasses do not require a power source to work. Light with left-hand polarisation can pass through the left lens and light with right-hand polarisation can pass through the right-hand lens. These glasses are used in conjunction with another device which polarizes the image, such as a ***ZScreen***.

Anamorphic lens

A special lens which, when used with the ***TheaterScope aspect ratio***, allows watching 2.35:1 content packed in a 16:9 source.

Aspect ratio

The proportional relationship between the width and the height of the projected image. It is represented by two numbers separated by a colon, indicating the ratio of image width and height respectively: for example, 16:9 or 2.35:1.

Not to be confused with ***resolution***.

Blanking (projection)

The ability to intentionally turn off, that is, set to black, areas around the edges of the projected image. It is sometimes referred to as "curtains" since it can be used to blank an area of image that literally falls on the curtains at the side of the screen in a movie theater. Usually no image resizing or geometric correction takes place and the "blanked" part of the image is lost.

Not to be confused with horizontal and vertical ***blanking (video signal)***.

Blanking (video signal)

The section of the video signal where there is no active video data.

Not to be confused with ***blanking (projection)***.

Brightness (electronic control)

A control which adds a fixed intensity value to every pixel in the display, moving the entire range of displayed intensities up or down, and is used to set the black point in the image (see ***Contrast***). In ***S-Video*** and ***Component Video*** signals, brightness is the same as ***luminance***.

Brightness (optical)

Describes how 'bright' an image that is projected onto a screen appears to an observer.

C

See ***Chrominance***.

Chrominance

Also known as '***C***', this is the component, or pair of components, of an ***S-Video*** or ***Component Video*** signal which describes ***color difference*** information.

Cold mirror

A mirror that preferentially reflects or transmits infra-red light. In a projector, a cold mirror is used to reflect the visible component of the lamp beam into the illumination optics and transmit the unwanted infrared radiation into an absorber.

Color difference

In ***S-Video*** or ***Component Video*** signals, the difference between specified colors and the ***luminance*** component. Color difference is zero for monochrome images.

Color gamut

The spectrum of color available to be displayed.

Notes

Color temperature

The position along the black body curve on the chromaticity diagram, normally quoted in Kelvin. It takes into account the preset values for color balance in the service set-up to take up the variations in the prism. The projector allows you to adjust this temperature (i.e. adjust the picture color temperature).

Component video

A three or four wire video interface that carries the signal split into its basic ***RGB*** components or ***luminance*** (***brightness***) and two-***color-difference*** signals (***YUV***) and ***synchronization*** signals.

Composite video

A signal line that carries ***luminance***, ***chrominance***, ***synchronization*** pulses and ***blanking***.

Contrast (electronic control)

The adjustment of the white point of the image without affecting the black point. This increases the intensity range of the displayed image.

Contrast (optical)

The intensity difference between the darkest and lightest areas of the screen.

Cr, Cb

Color difference signals used with '***Y'*** for digital ***Component Video*** inputs. They provide information about the signal color. Not to be confused with ***Pr, Pb***.

Crop

Remove part of the projected image.

Alternatively, fit an image into a frame with a different ***aspect ratio*** by removing part of the image. The image is resized so that either its length or its width equals the length or width of the frame, while the other dimension has moved outside the frame; the excess area is then cut out.

Notes

Dark time

The time inserted between frames when using ***3D active glasses***, to avoid ***ghosting*** caused by switching time between left and right eye.

DDC (Display Data Channel)

A communications link between the source and projector. DDC is used on the HDMI, DVI and VGA inputs. The link is used by the source to read the ***EDID*** stored in the projector.

Deinterlacing

The process of converting ***interlaced*** video signals into ***progressive*** ones.

DHCP (Dynamic Host Configuration Protocol)

A network protocol that is used to configure network devices so that they can communicate on an IP network, for example by allocating an IP address.

DMD™ (Digital Micromirror Device™)

The optical tool that transforms the electronic signal from the input source into an optical image projected on the screen. The DMD™ of a projector has a fixed ***resolution***, which affects the ***aspect ratio*** of the projected image.

A Digital Micromirror Device™ (DMD™) consists of moving microscopic mirrors. Each mirror, which acts as a pixel, is suspended between two posts by a thin torsion hinge. It can be tilted to produce either a bright or dark pixel.

EDID (Extended Display Identification Data)

Information stored in the projector that can be read by the source.

EDID is used on the HDMI, DVI and VGA inputs, allowing the source to automatically configure to the optimum display settings.

EDTV (Enhanced Definition Television)

A ***progressive*** digital television system with a lower resolution than ***HDTV***.

Notes

Frame rate multiplication

To stop low frame rate 3D images from flickering, frame rate multiplication can be used, which increases the displayed frame rate by two or three times.

Gamma

A nonlinear operation used to code and decode ***luminance***. It originates from the Cathode Ray Tube technology used in legacy television sets.

Ghosting

An artifact in 3D image viewing. Ghosting occurs when an image intended for one eye is partially seen by the other eye.

Ghosting can be removed by optimizing the ***dark time*** and sync delay.

Global setting

A projector setting that affects all inputs. In the ***OSD***, global settings are indicated with a globe icon.

HDCP (High-bandwidth Digital Content Protection)

An encryption scheme used to protect video content.

HDTV (High Definition Television)

A television system with a higher resolution than ***SDTV*** and ***EDTV***. It can be transmitted in various formats, notably ***1080p*** and 720p.

Hertz (Hz)

Cycles per second.

Horizontal Scan Rate

The rate at which the lines of the incoming signal are refreshed. The rate is set by the horizontal ***synchronization*** from the source and measured in ***Hertz***.

Notes

Hs + Vs

Horizontal and vertical ***synchronization***.

Hue

The graduation (red/green balance) of color (applicable to ***NTSC***).

Interlacing

A method of updating the image. The screen is divided in two fields, one containing every odd horizontal line, the other one containing the even lines. The fields are then alternately updated. In analog TV interlacing was commonly used as a way of doubling the refresh rate without consuming extra bandwidth.

Interleaving

The alternation between left and right eye images when displaying 3D.

IRE

A unit used to show the range from black to white in ***Composite Video*** signals.

LED (Light Emitting Diode)

An electronic component that emits light.

Letterboxing

Black margins at the top and bottom of the image. Letterboxing appears when a wider image is packed into a narrower frame without changing the original ***aspect ratio***.

Lumen

A photometric unit of radiant power. For projectors, it is normally used to specify the total amount of emitted visible light.

Notes

Luminance

Also known as '***Y***', this is the part of an ***S-Video*** or ***Component Video*** signal which affects the brightness, i.e. the black and white part.

Modal setting

A projector setting that only affects the currently displayed input.

Noise

Electrical interference displayed on the screen.

NTSC (National Television Standards Committee)

The United States standard for television - 525 lines transmitted at 60 ***interlaced*** fields per second.

OSD (on-screen display)

The projector menus allowing you to adjust various ***global*** and ***modal settings***.

PAL (Phase Alternate Line)

The television system used in the UK, Australia and other countries - 625 lines transmitted at 50 ***interlaced*** fields per second.

Pillarboxing

Black margins at the left and right of the image. Pillarboxing appears when a narrower image is packed into a wider frame without changing the ***aspect ratio***.

Pr, Pb

Color difference signals used with '***Y'*** for analog ***Component Video*** inputs. They provide information about the signal color. Not to be confused with ***Cr, Cb***.

Progressive scanning

A method of updating the image in which the lines of each frame are drawn in a sequence, without ***interlacing***.

Notes

Resolution

The number of pixels in an image, usually represented by the number of pixels per line and the number of lines (for example, 1920 x 1200).

RGB (Red, Green and Blue)

An uncompressed ***component video*** standard.

S-Video

A video signal which has separate ***Y*** and ***C*** signals.

Saturation

The amount of color in an image.

Scope

An ***aspect ratio*** of 2.35:1.

SDTV (Standard Definition Television)

An ***interlaced*** television system with a lower resolution than ***HDTV***. For ***PAL*** and ***SECAM*** signals, the resolution is 576i; for ***NTSC*** it is 480i.

SECAM (Sequential Color with Memory)

The television system used in France, Russia and some other countries - 625 lines transmitted at 50 ***interlaced*** fields per second.

SPDIF

Sony/Philips Digital Interface. A digital audio interface standard.

SX+

A display ***resolution*** of 1400x1050 pixels with a 4:3 screen ***aspect ratio***. (Shortened from *SXGA+*, stands for *Super Extended Graphics Array Plus*.)

Notes

Synchronization

A timing signal used to coordinate an action.

TheaterScope

An ***aspect ratio*** used in conjunction with a special ***anamorphic lens*** to display 2.35:1 images packed into a 16:9 frame.

Throw distance

The distance between the screen and the projector.

Throw ratio

The ratio of the ***throw distance*** to the screen width.

TRF (Throw ratio factor)

A special number used in calculating ***throw distances*** and ***throw ratios*** when the image does not fill the width of the ***DMD™***.

The ***throw ratio*** for a particular lens is fixed but assumes that the image fills the width of the ***DMD™***. For images that do fill the full width of the ***DMD™***, TRF = 1. For images that do not fill the ***DMD™***, TRF is effectively increased.

UXGA

A display ***resolution*** of 1600x1200 pixels with a 4:3 screen ***aspect ratio***. (Stands for *Ultra Extended Graphics Array*.)

Vertical Scan Rate

The rate at which the frames of the incoming signal are refreshed. The rate is set by the vertical ***synchronization*** from the source and measured in ***Hertz***.

Vignetting

Optical cropping of the image caused by the components in the projection lens. This can happen if too much offset is applied when positioning the image using the lens mount.

Notes

Vista

An ***aspect ratio*** of 1.66:1.

Warp

A set of projector functions that allow you to intentionally distort the image, for example to fit an arbitrarily shaped screen.

WUXGA

A display ***resolution*** of 1920 x 1200 pixels with a 16:10 screen ***aspect ratio***. (Stands for Widescreen *Ultra Extended Graphics Array*.)

Y

This is the ***luminance*** input (***brightness***) from an ***S-Video*** or ***Component Video*** signal.

YUV

See ***Pr, Pb***.

ZScreen

A special kind of light modulator which polarizes the projected image for 3D viewing. It normally requires that images are projected onto a silver screen. The ZScreen is placed between the projector lens and screen. It changes the polarization of the projected light and switches between left- and right-handed circularly polarized light at the field rate.

Notes